70—5

Proceedings of the American Academy of Arts and Sciences

Vol. 70, No. 5—August, 1935

# STUDIES IN THE BROMELIACEAE—VI

By Lyman B. Smith

With Four Plates

(Continued from page 3 of cover.)

## VOLUME 70.

1. Bridgman, P. W.—The Melting Curves and Compressibilities of Nitrogen and Argon. pp 1–32. March, 1935 $0.65.
2 Wheeler, William Morton, MacCoy, Clinton V., Griscom, Ludlow, Allen, Glover M., and Coolidge, Harold J., Jr.—Observations on the Behavior of Animals During the Total Solar Eclipse of August 31, 1932. pp 33–70 March, 1935 $0.75.
3. Bridgman, P. W.—Measurements of Certain Electrical Resistances, Compressibilities, and Thermal Expansions to 20000 kg/cm². pp. 71–101. April, 1935. $0.75.
4. Carpenter, Frank M.—The Lower Permian Insects of Kansas. Part 7. The Order Protoperlaria. pp. 103–146. May, 1935. $0.90.
5. Smith, Lyman B.—Studies in the Bromeliaceae, VI. pp. 147–220, 1935. $1.35.

**Proceedings of the American Academy of Arts and Sciences**

Vol. 70, No. 5—August, 1935

# STUDIES IN THE BROMELIACEAE—VI

1. Preliminary records
2. Synopsis of the Tribe *Tillandsieae*. Part 2

By Lyman B. Smith

With Four Plates

# STUDIES IN THE BROMELIACEAE—VI[1]

By Lyman B. Smith

Received May 9, 1935 Presented March 13, 1935

## 1. Preliminary Records

Studies during the past year have resulted in the discovery of several novelties and cases of previously unnoted synonymy, which are put on record here preliminary to a revision of the genera involved.

In preparing the present paper, I have had the good fortune to receive coöperation from a large number of individuals and institutions as is shown by the following list of exsiccatae citations: the Gray Herbarium of Harvard University (G), the Unites States National Museum (US), the New York Botanical Garden (NY), the Brooklyn Botanic Garden (Brooklyn), the Field Museum of Natural History (FM), the Missouri Botanical Garden (Mo), the private herbarium of Prof. L. H. Bailey of Ithaca, New York (Bailey), the University of Michigan (Mich), the University of California (UCal), the Dudley Herbarium of Stanford University (DH), Pomona College (Pom), the Royal Botanic Gardens at Kew (K), the British Museum of Natural History (BM), the University of Cambridge (Cam), the Riks Museum at Stockholm (S), the Botanical Museum of Copenhagen (Ko), the Herbarium of the Botanical Museum at Berlin-Dahlem (B), the Botanical Museum of Munich (Mun), the Rijks Herbarium of Leiden (Ldn), the Muséum National d'Histoire Naturelle at Paris (P), the National Museum of Prague (Prague), the Conservatory of Botany at Geneva (Gen), the Barbey-Boissier Herbarium (Bo), the Herbarium of the Royal Botanic Gardens of Trinidad and Tobago (Trin), the Herbarium of the Botanic Garden of Rio de Janeiro (JB Rio), the National Museum at Rio de Janeiro (MN Rio), the Biological Institute of São Paulo (SP), the private herbarium of Don Cornelio Osten of Montevideo, Uruguay (Ost), the National Museum of Natural History of Buenos Aires (BA), the National Museum at Santiago, Chile (Chile).

I am particularly indebted to Mr. N. Y. Sandwith, Mr. J. E. Dandy, Prof. H. Harms, Don Cornelio Osten and Dr. Alberto Castellanos for critical notes on certain species.

[1] Contributions from the Gray Herbarium of Harvard University, no. CVI. This paper is divided into (1) Preliminary records (pp. 147 ff.), and (2) Synopsis of the tribe *Tillandsieae*, Part 2 (pp. 156 ff.).

**Billbergia decora** Poepp. & Endl. Nov. Gen. ii. 42, t. 157 (1838). *B. boliviensis* Bak. Brom. 81 (1889).

PERU: LORETO: province of Maynas near Yurimaguas, *Poeppig 2432* (Gen, TYPE COLLECTION; phot. G); Yurimaguas, lower Rio Huallaga, alt. 135 m., 1929, *Killip & Smith 27646* (G, US, FM); JUNIN: Pichis Trail, Yapas, alt. 1350–1600 m., 1929, *Killip & Smith 25609* (US). BOLIVIA: LA PAZ: Unduavi, alt. 2600 m., 1885, *Rusby 2853* (NY, type of *B. boliviensis;* phot. G).

The type of *Billbergia boliviensis* closely resembles *B. decora* in the shape and size of its sepals as well as in other characters, and nothing remains as a basis for separating the two.

**Canistrum perplexum**, spec. nov., floriferum ad 4 dm. altum: foliis rosulatis, patentibus, ad 5 dm. longis; vaginis late ellipticis, ad 15 cm. longis, dense minuteque castaneo-lepidotis; laminis lingulatis, 4–5 cm. latis, late rotundatis apiculatisque, minute serrulatis, dissite perobscureque lepidotis: scapo erecto, 4 mm. diametro, dense umbrino-lanato; scapi bracteis late ellipticis, apiculatis, roseis, adpresse lepidotis, unica prope basin scapi, reliquis cyathidium sub inflorescentiam formantibus; inflorescentia percompacte bipinnatim paniculata, 5 cm. longa, 6–7 cm. diametro, dense umbrino-lanata; bracteis primariis late ovatis, mucronatis, integris, quam spicae brevioribus, membranaceis, nervatis: spicis densissimis, paucifloris; bracteis florigeris primariis similibus sed angustioribus, quam sepala paulo brevioribus: floribus sessilibus, 3 cm. longis; sepalis liberis, ellipticis, mucronatis, 19 mm. longis, paulo asymmetricis; petalis lingulatis, obtusis, apiculatis, 20 mm. longis, caeruleis, a ligulis binis elongatis filamenta involventibus auctis; staminibus petala subaequantibus; ovario ellipsoideo, tubo epigyno 2 mm. longo; placentis loculorum ad apicem versus lineatim affixis; ovulis obtusis. Pl. I, figs. 12–15.

BRAZIL: SÃO PAULO: Jardim Botanico, São Paulo, 1934, *Hoehne 31550* (G, TYPE; SP); Alto da Serra, alt. 800–900 m., 1929, *L. B. Smith 1969* (G).

In its coloration and indument this species closely resembles *Canistrum roseum*, but it is smaller and more slender in habit and the appendages on the petals are connate for their entire length. This type of appendage is discussed further on under *Hohenbergia*.

**Guzmania Hitchcockiana**, spec. nov., florifera metralis (Hitchcock!): foliis ligulatis, 1 m. vel ultra longis, 6 cm. latis, acuminatis, supra glabris, subtus dense minuteque brunneo-lepidotis: scapo ignoto: inflorescentia ample laxeque bipinnata, dense brunneo-lepidota; bracteis primariis inferioribus anguste triangularibus, quam rami axillares subduplo brevioribus: spicis ad 13 cm. longis, longe stipitatis; bracteis florigeris late ovatis, obtusis, 12 mm. longis, sublaevibus, nullo modo carinatis: floribus subpatentibus, crasse pedi-

cellatis, solum fructiferis cognitis; sepalis oblongis, late obtusis, dense lepidotis, ca. 20 mm. longis, ad 10 mm. connatis; petalis staminibusque ignotis. Pl. I, fig. 1.

ECUADOR: GUAYAS: Teresita, 3 km. west of Bucay, alt. 270 m., 1923, *Hitchcock 20436* (US, TYPE; phot. G, NY).

This species is most nearly related to *G. Scherzeriana* Mez from which it differs in its dense brown indument.

**Hechtia Meziana,** spec. nov., florifera ut videtur fere metralis: foliis ad 8 dm. longis, angustissime triangularibus, 3 cm. latis, utrinque dense adpresseque ferrugineo-lepidotis, spinis ad 6 mm. longis armatis, apice longe attenuatis et inermibus: scapo elongato, gracili, ca. 7 mm. diametro, glabro; scapi bracteis parvis, maxime remotis, ex ovato acuminatis, chartaceis, roseis: inflorescentia perlaxe bipinnatim paniculata, 4 dm. longa et 15 cm. diametro, rosea, glaberrima; bracteis primariis eis scapi similibus, quam bases steriles ramorum subduplo brevioribus; ramis gracilibus, laxe florigeris: bracteis florigeris ovatis, acutis, pedicellos aequantibus vel superantibus, membranaceis: floribus pedicellis usque ad 3 mm. longe stipitatis, femineis solum cognitis; sepalis late triangulari-ovatis, acutis, 4 mm. longis, chartaceis; petalis ovato-lanceolatis, acutis, 9–10 mm. longis, pulchre roseis; filamentis 4–6 mm. longis, antheris abortivis; ovario glabro, stylo brevissimo. Pl. I, figs. 2–3.

MEXICO: CHIAPAS: Rocky banks, ravines near Monserrate, 1925, *Purpus 10276* (NY, TYPE; phot. G).

*Hechtia Desmetiana* is probably the nearest relative of this species, but differs in having large foliaceous scape-bracts and leaves glabrous above.

**Hohenbergia** Schult. f. As first conceived, *Hohenbergia* was composed of very diverse elements and it was not until Mez's treatment in the Flora Brasiliensis[1] that it was made homogeneous by taking *H. stellata* as typical and excluding the remainder of the species originally proposed. Later treatments bring the number of species to about thirty, but all follow Mez's definition closely and the limits of *Hohenbergia* may be considered as reasonably well settled.

On the other hand, the position of *Hohenbergia* relative to the other members of the *Bromelioideae* is debatable. Mez and Harms have placed it among the genera characterized by naked petals, although both admit the presence of so-called calli on the petals of *H. stellata* and certain other species. Apparently their stand is that these structures are essentially simple, amounting to little more than slight

[1] Mez in Mart. Fl. Bras. iii. pt. 3, 263 (1891).

thickenings of the petal and not comparable with such structures as the nectar-scales in *Aechmea*.

On the contrary these structures of *Hohenbergia* are among the most complex in the family, and are equaled in development only in *Gravisia*, *Ananas*, and possibly some species of *Billbergia*. The illustration of the petal of *H. inermis* (Pl. I, fig. 4) shows that these "calli" are in reality slenderly infundibuliform nectar-scales with the side next the petal much produced upward and finally free so that the scale often appears double. I have observed this same structure in *H. caymanensis*, *H. penduliflora*, and *H. Urbaniana*. In *H. spinulosa*, I have found the scales without the upward prolongation, and in *H. eriostachya* and *H. portoricensis* the long ridges but no pockets. This latter type is apparently the one found in *H. stellata* to judge by illustrations. It seems likely that the basic form of the appendage is that illustrated by *H. inermis* and that the other two have evolved from it by reduction.

*Hohenbergia* should be placed among the genera of the *Bromelioideae* with appendaged petals. It is most nearly related to *Gravisia* which has the identical petal-structure. E. Morren has illustrated this well for *Gravisia exsudans* in Belgique Horticole, xxix. t. 18, although under the name *Hohenbergia exsudans*. In fact no distinction remains between the two genera except the form of the pollen.

**Hohenbergia caymanensis** Britton in herb., spec. nov., foliis magnis, ca. 8 cm. latis, apice acumine lato brevique imposito optime rotundatis, margine spinis parvis vix 1 mm. longis praeditis, utrinque e lepidibus brunneis minutissime puncticulatis: scapo ca. 8 mm. diametro, e lepidibus ferrugineis dense furfuraceo, vaginis lineari-lanceolatis lepidotis membranaceis minute serrulatis fere omnino obtecto: inflorescentia sublaxe bipinnata, 4 dm. longa, ubique ferrugineo-lepidota; bracteis primariis eis scapi similibus, infimis spicas axillares bene superantibus: spicis densis, ellipsoideis, 3 cm. longis, supremis breviter, infimis ad 2 cm. stipitatis; bracteis florigeris ad 12 mm. longis, e basi triangulari-ovata in setam subaequilongam productis, valde nervatis, supremis sterilibus: floribus ad 14 mm. longis; sepalis liberis, 6 mm. longis, valde asymmetricis, apice in spinam maximam subaequilongam pallidam productis; petalis ex sicco caeruleis, 10 mm. longis, oblongo-lanceolatis, valde acutis, ligulis binis, nectaria profunda angustissime obconica formantibus, apice in vaginam elongatam grosse serratam et cum petalo maxime connatam excurrentibus; staminibus inclusis, seriebus II cum petalis alte connatis; ovulis obtusis. Pl. I, figs. 5–6.

GRAND CAYMAN: 1890–91, *J. T. Rothrock 495* (NY, TYPE; phot. G).

This species is most nearly related to *H. spinulosa* Mez but differs in having the spikes stipitate.

**Hohenbergia negrilensis** Britton in herb., spec. nov., e fragmentis solum cognita, florifera ut videtur ultra metralis: foliis maximis, crasse coriaceis; laminis ligulatis, 15 cm. latis, apice rotundatis et triangulari-apiculatis, spinis vix 1 mm. longis armatis, supra glabra, subtus dense adpresseque pallido-lepidotis: scapo ca. 7 mm. diametro; scapi bracteis lineari-lanceolatis, acuminatis, densissime imbricatis, chartaceis, pallidis: inflorescentia elongato-thyrsoidea, densissime bipinnatim paniculata, ultra 5 dm. longa, 1 dm. diametro; bracteis primariis eis scapi similibus, perelongatis, infimis spicas axillares triplo superantibus, supremis quam spicae subduplo brevioribus; spicis omnibus sessilibus, suberectis vel patentibus, cylindricis, ad 6 cm. longis, 2 cm. diametro: bracteis florigeris spinula excepta 2–3 mm. longis, 5 mm. latis, latissime acutis vel rotundatis, apice spinula ad 4 mm. longa armatis, plus minusve nervatis; floribus fructiferis 9 mm. longis; petalis staminibusque ignotis; sepalis perasymmetricis, ca. 5 mm. longis, brevi-mucronulatis, pallido-lepidotis; ovario triangulato, appresse pallido-lepidotis. Pl. I, figs. 7–8.

JAMAICA: Vicinity of Negril, 1908, *Britton & Hollick 2023* (NY, TYPE; phot. G).

Owing to the age of the material any indument there may have been on the axes has disappeared. In habit this species resembles *H. spinulosa* Mez but the floral bracts are much shorter and the mucros of the sepals are very short.

**Hohenbergia stellata** Schult. f. in R. & S. Syst. vii. 1251 (1830). *H. oligosphaera* (Bak.) Mez in DC. Mon. Phan. ix. 124 (1896). *Aechmea oligosphaera* Bak. Brom. 48 (1889). Pl. I, fig. 9.

*Hohenbergia oligosphaera* has been separated from *H. stellata* on the basis of having unequal sepals and calli on the petals. An examination of the type of *H. stellata* in the Munich Herbarium shows that the anterior sepal is distinctly shorter than the two posterior ones, and it has already been noted that living material of the species shows appendages on the petals. Thus no distinction remains between the two species and the later *H. oligosphaera* must lapse.

**Mezobromelia**, gen. nov., foliis integris: floribus quaquaverse ordinatis, hermaphroditis; sepalis symmetricis; petalis intime conglutinatis, intus biligulatis; filamentis cum petalis connatis; ovario supero.

**Mezobromelia bicolor**, spec. nov., verisimiliter acaulis, florifera

fere 5 dm. alta: foliis ad 45 cm. longis, utrinque minutissime perobscureque lepidotis; vaginis ovatis, extus castaneis; laminis ligulatis, acutis, 25 mm. latis: scapo erecto, gracili; scapi bracteis erectis, densissime imbricatis, foliaceis sed supremis fulgide rubris: inflorescentia laxe bipinnatim paniculata, 12 cm. longa; axe glabro, sulcato; bracteis primariis latissime ovatis, fulgide rubris, perobscure lepidotis, infimis longe acuminatis, spicas superantibus, supremis apiculatis, quam spicae bene brevioribus: spicis breviter stipitatis, ellipsoideis, compacte 3–5-floris; rhachi brevi sed distincta; bracteis florigeris oblongo-lanceolatis, late acutis, ad 16 mm. longis, quam sepala brevioribus, ad apicem carinatis, glabris, chartaceis, valde nervatis: floribus subsessilibus; sepalis aequaliter subliberis, oblongo-lanceolatis, late acutis, 18 mm. longis, carinatis, glabris, nervatis; petalis lingulatis, obtusis, 20 mm. longis, citrinis (Killip!), a ligulis binis triangularibus alte insertis auctis; staminibus inclusis, stylum subaequantibus, filamentis cum petalis alte connatis vel conglutinatis. Pl. I, figs. 10–11.

COLOMBIA: El Valle: epiphytic, bushy summit of west peak, La Cumbre, alt. 2100–2400 m., 1922, *Killip 11396* (G, type).

In this genus the structure of the corolla is exactly like that in *Guzmania* except that there are scales alternating with the filaments at their point of attachment to the corolla.

Through the kindness of Mr. A. L. Delisle in preparing microtome sections of *Mezobromelia* and of *Guzmania monostachia*, I have been able to compare the relation of petals in the two in great detail. In neither is the corolla truly gamopetalous, but the petals are so folded and interlocked as to make it seem so even in fresh material (cf. Bot. Mag. t. 5220, fig. 2). In cross-section the edge of one petal appears forked or split and enfolds the filament and the edge of the adjacent petal.

It is a great pleasure to dedicate this genus to Dr. Carl Mez, who has done more than any other botanist to clarify the taxonomy of the *Bromeliaceae*.

**Neoregelia bahiana** (Ule), comb. nov. *Nidularium bahianum* Ule, Engl. Bot. Jahrb. xlii. 195 (1908). *Aregelia bahiana* Mez, Engl. Pflanzenr. [Heft 100] iv. fam. 32, 42 (1934).

BRAZIL: São Paulo: Alto da Serra, 1933, *Hoehne 31170* (SP, phot. G).

The species is already known from Minas Geraes as well as from Bahia.

**Neoregelia carcharodon** (Bak.), comb. nov. *Karatas carcharodon* Bak. Brom. 12 (1889). *Nidularium carcharodon* E. Morr. ex Bak. l. c. *Karatas macracantha* Bak. l. c. 8, nomen. *Aregelia carcharodon* Mez in DC. Mon. Phan. ix. 78 (1896).

**Neoregelia tristis** (Beer), comb. nov. *Bromelia tristis* Beer, Brom. 30 (1857). *Nidularium triste* Regel, Gartenfl. xv. 356 (1866). *Karatas tristis* Bak. Brom. 5 (1889). *Regelia tristis* Lindm. in Öfvers. Akad. Holm. 542 (1890). *Aregelia tristis* Mez in DC. Mon. Phan. ix. 68 (1896).

**Pitcairnia kniphofioides**, spec. nov., caulescens, florifera ad 75 cm. alta: foliis dimorphis, alteris e vagina triangulari-ovata setiformibus, badiis, margine validissime spinosis, alteris foliaceis, saturate caeruleo-viridibus (Lehmann!), ad 3 dm. longis, subpetiolatis, basi spinosis, laminis late lanceolatis, acuminatis, 4 cm. latis, glabris: scapo erecto, brunneo-floccoso; scapi bracteis supremis ovato-lanceolatis, acutis, glabris, quam internodia bene brevioribus: inflorescentia simplicissima, dense spicata, 12 cm. longa, glabra: bracteis florigeris ovatis, acutis, 2 cm. vel ultra longis, membranaceis, ante anthesin stricte erectis, dense imbricatis et flores obtegentibus, per anthesin deciduis: floribus per anthesin reflexis, subsessilibus; sepalis lanceolatis, late acutis, 15 mm. longis, nullo modo carinatis; petalis quam sepala paulo longioribus, caeruleo-albis, nudis; ovario ad 2/3 supero. Pl. I, fig. 18.

COLOMBIA: Cauca: terrestrial in damp woods, above Arrayanal on the Rio Ritaralda, alt. 2000 m., 1883, *Lehmann 3310* (Bo, type; phot. G).

Except for the inflorescence from which this species derives its name, it strongly resembles *Pitcairnia nigra*. Its petals, however, are naked.

**Puya lasiopoda**, spec. nov., e fragmento inflorescentiae solum cognita, florifera verisimiliter magna: inflorescentia laxe bipinnata, tomentoso-lepidota; bracteis primariis ovatis, minutissime serrulatis, submembranaceis, ex sicco rubris, quam rami axillares bene brevioribus sed partem sterilem ramorum excedentibus: racemis spiciformibus densis, ellipsoideis, ad 10 cm. longis et 5 cm. latis, longe graciliterque stipitatis; bracteis florigeris eis primariis similibus sed minoribus integrisque, sepala subaequantibus: floribus erectis, pedicellis graciliter obconicis, ad 7 mm. longis; sepalis anguste lanceolatis, 45 mm. longis, apice uncinatis, nullo modo carinatis; petalis angustissime ellipticis, acutis, 6 cm. longis, ex sicco atro-violaceis; stylo staminibusque elongatis, petala subaequantibus vel post anthesin paulo exsertis; ovulis obtusis. Pl. I, figs. 16–17.

BOLIVIA: El Beni: Reis, alt. [500 m., 1886, *Rusby 2232* (NY, type; phot. G).

In the character of its indument and texture of its bracts and sepals this species closely resembles *Puya stenothyrsa* (Bak.) Mez, but its sepals are nearly twice as large, the floral bracts are relatively

much narrower, and the spikes are much denser. The axes are much more tomentose than the bracts, making a noticeably sharp contrast.

In the size and form of its spikes, floral bracts and sepals it resembles *P. oxyantha*, but unlike that species it has spikes that have long slender stipes.

**Puya Rusbyi** (Bak.) Mez in DC. Mon. Phan. ix. 482 (1896); Mez in Engl. Pflanzenr. [Heft 100] iv. fam. 32, 297 (1935). *Pitcairnia Rusbyi* Bak. Brom. 122 (1889). *Puya Kuntzeana* Mez in DC. Mon. Phan. ix. 490 (1896); Mez in Engl. Pflanzenr. [Heft 100] iv. fam. 32, 308 (1935).

BOLIVIA: La Paz: near La Paz, alt. 3300 m., 1885, *Rusby 2846* (NY, TYPE; phot. G); Cochabamba: Tunari, alt. 1300 m., 1892, *Kuntze* (NY, type of *Puya Kuntzeana;* phot. G).

In identifying *Puya Kuntzeana* with *P. Rusbyi*, its characteristics, so well defined by Mez, obviate a detailed description of the latter species. *P. Rusbyi* has been misunderstood heretofore because its original description was drawn from *Rusby 2850* as well as from the type. *Rusby 2850* is *P. alpestris*, a native of central Chile. It is labelled as from Bolivia, but as Rusby collected in central Chile in the year that this specimen was gathered, it seems probable that a mixture of labels occurred.

**Puya sanctae-crucis** (Bak.), comb. nov. *Pitcairnia sanctae-crucis* Bak. Brom. 120 (1889). *Puya floccosa* E. Morr. sensu Mez in DC. Mon. Phan. ix. 478 (1896); Mez in Engl. Pflanzenr. [Heft 100] iv. fam. 32, 294 (1935), quoad plantas bolivianas, non E. Morr. (1889). *Pitcairnia robusta* Rusby, Bull. N. Y. Bot. Gard. vi. 488 (1910). Pl. II, fig. 1.

BOLIVIA: La Paz: Songo, 1890, *Bang 892* (G, NY, FM, Mo, BM, Bo); Apolo, alt. 1600 m., 1902, *R. S. Williams 2655* (NY, type of *Pitcairnia robusta;* phot. G); Santa Cruz: 1847, *Castelnau* (P, TYPE; phot. G).

In *Puya sanctae-crucis* the indument is deciduous at an early stage, not persistent as in *P. floccosa*. The flowers are much more distinctly pedicellate in *P. sanctae-crucis*, and the whole plant is much more like *P. Pearcei* than it is like *P. floccosa*.

*Quesnelia Lamarckii* Bak. Brom. 85 (1889). An examination of the type of this species in the Smithian Herbarium of the Linnean Society shows that it must be reduced to the synonymy of *Musa coccinea* Andr.

**Tillandsia** (§ **Allardtia**) **Cardenasii**, spec. nov., caulescens, florifera 20–25 cm. alta: caule ad 1 dm. longo, simplici: foliis erectis vel suberectis, dense polystiche ordinatis, ad 2 dm. longis; vaginis ovatis, 5 mm. longis, glabris, chartaceis; laminis lineari-triangularibus,

filiformi-acuminatis, basi 8 mm. latis, dense villoseque cinereo-lepidotis, involutis: scapo erecto, 1 mm. diametro, glabro, sulcato; scapi bracteis lanceolatis, internodia superantibus, atro-purpureis, adpresse lepidotis, infimis foliaceo-laminatis: inflorescentia foliis paulo superata, simplicissima, dense 4–7-flora, in circuitu lanceolata, complanata, 5 cm. longa, 1 cm. lata; bracteis florigeris eis scapi similibus sed glabris, dense imbricatis, submembranaceis, nullo modo carinatis, ad 27 mm. longis, sepala superantibus: floribus immaturis solum cognitis, brevissime pedicellatis; sepalis liberis, lanceolatis, acuminatis, ad 20 mm. longis, glabris, nervatis; petalis lingulatis, lilacinis (Cardenas!); staminibus stylum subaequantibus, quam petala paulo brevioribus: capsulis cylindricis, breviter rostratis, bracteas florigeras subaequantibus. Pl. III, figs. 5–6.

BOLIVIA: CHUQUISACA: rocky places, Cerro Macho, alt. 2730 m., 1933, *Cardenas 491* (G, TYPE).

**Tillandsia caribaea**, nom. nov. *T. Fendleri* Mez in DC. Mon. Phan. ix. 741 (1896), non Griseb. (1865).

**Tillandsia** (§ **Platystachys?**) **lepidosepala**, spec. nov., saepe pulvinata, acaulis vel subacaulis: foliis rosulatis, ad 15 cm. longis, dense pruinoseque cinereo-lepidotis; vaginis late ovatis vel suborbicularibus, nullo modo inflatis, 10–15 mm. longis; laminis erectis vel patentibus, lineari-triangularibus, acuminatis, basi 7 mm. latis, involutis: scapo brevi, foliis fere abscondito; scapi bracteis erectis, foliaceis, densissime imbricatis, inflorescentiam subaequantibus: inflorescentia fructifera solum cognita, simplicissima, dense 2–5-flora, foliis superata; bracteis florigeris lanceolatis, acutis, 20–35 mm. longis, sepala aequantibus vel superantibus, quam internodia 3–4-plo longioribus, submembranaceis, nullo modo carinatis, densissime cinereo-lepidotis: floribus sessilibus; sepalis liberis, lanceolatis, acuminatis, ad 20 mm. longis, valde nervatis, dense lepidotis, lateralibus carinatis; petalis genitalibusque ignotis: capsulis cylindricis, breviter rostratis, bracteas florigeras subaequantibus. Pl. II, figs. 2–3.

MEXICO: HIDALGO: near Tula, 1905, *Rose, Painter & Rose 8283* (US); MICHOACAN: on trees near Lake Cuitzco, 1892, *Pringle 5323* (G, TYPE); PUEBLA: Teocalli de Cholula, alt. 2224 m., 1907, *Arsène 1846* (US); Malintze, 1910, *Nicolas 5742* (US).

This species has until now been confused with *T. Ehrenbergiana*, from which it differs in its nearly acaulescent habit and very densely imbricate foliaceous scape-bracts.

**Tillandsia Reichenbachii** Bak. Brom. 166 (1889). *T. tucumanensis* Mez in DC. Mon. Phan. ix. 853 (1896). *T. Herzogii* Wittm. Mededell. Rijks Herb. xxix. 89 (1916).

BOLIVIA: Santa Cruz: "monte" near Cumbarute, alt. 800 m., 1910, *Herzog 1151* (Ldn, type of *T. Herzogii;* B, phot. G); Charagua, alt. 800 m., 1934, *Cardenas 2682* (G). ARGENTINA: Jujuy: San Pedro de Jujuy, alt. 600 m., 1925, *Schreiter 153* (G, Ost, BA); 1926, *Venturi 5326* (G, FM, Mo); Salta: dept. Guachipas, Alemania, alt. 1300 m., 1929, *Venturi 9883, 10018* (G); Tucuman: sketch of living plant in Hamburg gardens brought from Tucuman (K, type; phot. G); Barranca Colorada near Tucuman, 1873, *Lorentz & Hieronymus* (B, type of *T. tucumanensis;* phot. G); Quebrada de San Rafael, 1918, *Schreiter 27/2349* (G, BA); Campo Alegre, alt. 400 m., 1922, *Schreiter 802* (Ost); dept. Burroyacu, Cerro del Campo, alt. 800 m., 1928, *Venturi 7759* (G, Mo).

Although *Tillandsia Reichenbachii* is based only on a crude sketch, there seems to be sufficient evidence to establish its identity. The sketch shows a plant with a short stem, polystichous leaves, and large suborbicular petal-blades. This immediately reduces the possibilities in Tucuman, the type locality, to two species, *T. Duratii* and one that has been going under the name of *T. tucumanensis. T. Duratii* has circinnate leaves that are much stouter than those of *T. tucumanensis.* The sketch of *T. Reichenbachii* definitely shows the fine filiform-acuminate leaves of *T. tucumanensis* which are merely curved and not circinnate. Furthermore, material of so-called *T. tucumanensis* gathered in Tucuman, *Venturi 7759,* shows that plants with compound and simple inflorescences may occur in the same collection. Thus it is evident that *T. Reichenbachii* must include the later *T. tucumanensis.* The identity of *T. Herzogii* with *T. Reichenbachii* has been overlooked heretofore because of the scant knowledge of the latter species, and probably also because the types came from different countries.

## 2. Synopsis of the Tribe Tillandsieae. Part 2.

The following installment of the synopsis consists of a revision of those species of *Tillandsia* which have a simple distichous- or single-flowered inflorescence and caulescent habit. Such a treatment is necessarily somewhat artificial in character, cutting across several of the natural sections of *Tillandsia* in order to achieve its primary aim of providing a rapid key for fruiting material. Yet about half of these species belong to the sections *Phytarrhiza* and *Diaphoranthema* between which the transition is so gradual that they may be considered as presenting a solid block of species. The unrelated elements come from *Allardtia, Anoplophytum* and *Platystachys.*

It should be understood here that I have changed the typification of *Anoplophytum,* making its transversely plicate filaments diagnostic, and have reduced the sections *Pityrophyllum* and *Acrobia* to *Platy-*

*stachys* and *Allardtia* respectively. *Pityrophyllum* is not tenable because the break between a paniculate inflorescence with few-flowered distichous spikes and one of a single polystichous-flowered spike is no stronger here than it is within the sections *Allardtia* and *Anoplophytum*. *Tillandsia brachycaulos* Schdl., for instance, may have either type of inflorescence according to the vigor of its growth, just as may *T. biflora* R. & P. of the section *Allardtia*. *Aerobia* supposedly had more deeply included stamens than *Allardtia*, but in checking the latter I find that there is every degree of transition from barely included to deeply included stamens.

In addition to the natural groupings included, the plants in this revision derive a unity of their own from certain characters corollary to their caulescent habit. In all the species, for example, the leaf-blades are relatively thick and are either linear or narrowly triangular, never lingulate. In most cases they are plants of distinctly xerophytic habitat and have the scales on the leaves strongly developed.

The distinction between simple and compound inflorescences is an extremely convenient one in handling fruiting material. In the large majority of cases a given species is limited to one category or the other, being what we might term "obligate-simple" or "obligate-compound." In a small proportion of cases, a species while normally of one type may at times be the other, or what may be termed "facultative-simple" or "facultative-compound." In the latter case the species is treated in the part of the synopsis dealing with its normal state, but is keyed in parenthesis in the part dealing with its facultative state.

In citing material certain specimens are cited on the authority of others when it has not been possible for me to examine them personally and where the species are well marked and generally agreed upon. In such cases the authority and an exclamation mark are enclosed in parenthesis immediately following the specimen.

Certain species of this revision are so common that it has been necessary to abridge their bibliography and the citation of their specimens but in all cases the really significant literature is given and enough specimens are cited to illustrate the present knowledge of their distribution.

KEY TO SPECIES

1. Spikes with flowers distichous or secund, or else the inflorescence reduced to a single flower.
   2. Sepals asymmetric, free, oblong or broadest near the apex, not over 10 mm. long..... *Tillandsia* § *Pseudo-Catopsis*.[1]

[1] CONTRIB. GRAY HERB. lxxxix. 15 (1930).

2. Sepals symmetric, or if slightly asymmetric, ovate or lanceolate, broadest near the base.
3. Inflorescence of a single spike or reduced to a single flower, either terminal or pseudoaxillary.
4. Plant caulescent: leaf-blades linear or triangular. *Tillandsia* in part.
5. Leaves polystichous.
6. Leaves much more than 15 mm. long: plant not at all moss-like.
7. Scape-bracts more than 2 when the scape is present, always concealing the greater part of the scape and usually imbricate.
8. Inflorescence more than 2-flowered, usually scapose.
9. Floral bracts and flowers erect at anthesis, diverging only in so far as they are forced to make room for those directly above them.
10. Leaf-blades less than 3 times as long as the barely distinct sheaths, (Cf. pl. III, fig. 1).
11. Floral bracts prominently nerved, lepidote.
12. Inflorescence scapose: petals blue or violet. Peru . . . . . 1. *T. cauligera.*
12. Inflorescence sessile: petals rose. Peru. 2. *T. Macbrideana.*
11. Floral bracts nearly or quite even, glabrous. Argentina . . . . . 3. *T. Friesii.*
10. Leaf-blades many times longer than the usually distinct sheaths. (Cf. pl. III, figs. 2, 5, 7).
13. Inflorescence dense: floral bracts nearly or quite twice as long as the internodes.

(*See continuation*)

(*Continuation*)

14. Floral bracts not more than 20 mm. long.
15. Floral bracts ovate or lanceolate, not (or very minutely) apiculate.
16. Floral bracts evenly convex, not at all carinate.
17. Floral bracts equaling or exceeding the sepals.
18. Sepals glabrous.
19. Floral bracts merely acute: spike linear or lance-linear in outline. (Cf. pl. II, fig. 4).
20. Leaves pungent, appressed- or subpruinose-lepidote.
21. Floral bracts glabrous, faintly nerved. Peru, Bolivia . . . . . 4. *T. caulescens.*
21. Floral bracts densely lepidote, strongly nerved. Brazil . . . . . 5. *T. dura.*
20. Leaves with soft filiform-acuminate apices, tomentose-lepidote.
22. Leaves abruptly spreading from the base of the blade, widely spaced. Colombia, Peru, Bolivia, Chile . . . . . 18. *T. paleacea.*
22. Leaves strict and rather dense. Paraguay . . 19. *T. arhiza.*
19. Floral bracts acuminate: spike broadly lanceolate or oblanceolate. (Cf. pl. II, fig. 5). Argentina . . 12. *T. argentina.*
18. Sepals densely lepidote. Colombia, Ecuador . . 13. *T. incarnata.*

17. Floral bracts distinctly shorter than the sepals.
23. Plants long-caulescent: leaves mostly shorter than the stem.
24. Leaves abruptly spreading from the base of the blade, widely spaced. Colombia, Peru, Bolivia Chile. 18. *T. paleacea.*
24. Leaves strict and rather dense. Paraguay.....19. *T. arhiza.*
23. Plants short-caulescent: leaves much longer than the stem.
25. Leaves strongly pruinose- or tomentose-lepidote. Brazil, Peru, Bolivia, Paraguay.....(*T. streptocarpa.*)[1]
25. Leaves appressed-lepidote.
26. Leaf-blades slender, filiform-acuminate, barely if at all circinnate: floral bracts glabrous. Bolivia, Argentina.....(*T. Reichenbachii.*)[1]
26. Leaf-blades stout, pungent, strongly circinnate: floral bracts usually lepidote. Bolivia, Paraguay, Uruguay, Argentina.....(*T. Duratii.*)[1]
16. Floral bracts sharply carinate: flowers often viviparous. Colombia, Ecuador, Peru.....(*T. latifolia.*)[1]
15. Floral bracts suborbicular, membranaceous, the lower ones long-apiculate. Cuba to northern Argentina.....(*T. pulchella.*)[2]
14. Floral bracts distinctly more than 20 mm. long.
27. Sepals densely and persistently lepidote.
28. Scape-bracts foliaceous: scape very short. Mexico..(*T. lepidosepala.*)
28. Scape-bracts or at least the upper ones thin and not at all foliaceous.
29. Leaf-blades 10–17 mm. wide, flat except near the apex, appressed- or slightly pruinose-lepidote. Colombia, Ecuador.....13. *T. incarnata.*
29. Leaf-blades 3 mm. in diameter, involute, villous-lepidote. Mexico.....14. *T. Ehrenbergiana.*
27. Sepals glabrous.
30. Floral bracts obtuse and often apiculate, membranaceous: inflorescence terete at anthesis: leaf-sheaths suborbicular, not at all auricled. Mexico and the West Indies to Venezuela and Colombia.....15. *T. Schiedeana.*
30. Floral bracts acute or acuminate: inflorescence usually complanate.
31. Floral bracts all densely and persistently lepidote: scape largely obscured by the leaves. Bolivia.....(*T. boliviensis.*)
31. Floral bracts glabrous or the lowest with a few early deciduous scales.
32. Scape appearing nearly as thick as the inflorescence because of its very densely imbricate bracts: flowers viviparous. Chile.....6. *T. Werdermannii.*
32. Scape appearing distinctly more slender than the inflorescence: flowers never viviparous.
33. Leaves reflexed-tomentose with very fine elongate scales: leaf-blades only 8 mm. wide at base. Bolivia. 7. *T. Cardenasii.*
33. Leaves appressed- or coarsely pruinose-lepidote with suborbicular scales.

---

[1] Inflorescence normally compound, species to be treated in later article.

[2] Inflorescence typically simple and polystichous-flowered, but a single specimen known, *Wilkes Expedition* (G), from Brazil, with a reduced simple distichous-flowered inflorescence.

34. Stem shorter than the densely massed leaves.
35. Floral bracts not over 40 mm. long: scape always elongate: sepals obtuse.
36. Leaves with soft filiform-acuminate apices: stem very short. Chile.....8. *T. Geissei.*
36. Leaves with straight pungent or subpungent apices.
37. Floral bracts rarely more than 25 mm. long: petal-blades narrowly elliptic.
38. Floral bracts prominently nerved: leaves evenly fine-acuminate. Bolivia, Brazil, Paraguay, Argentina.....(*T. Lorentziana.*)
38. Floral bracts even except near apex: leaves gradually narrowed to an abruptly acute apex. Argentina.....12. *T. argentina.*
37. Floral bracts 25–40 mm. long: leaves gradually narrowed to an abruptly acute apex: petal-blades large, suborbicular. Uruguay. 9. *T. arequitae.*
35. Floral bracts up to 70 mm. long: scape usually short and concealed by the leaves: petal-blades large, suborbicular. Bolivia, Uruguay, Argentina.....10. *T. xiphioides.*
34. Stem longer than the few-ranked widely spaced spreading leaves: petal-blades large, suborbicular. Argentina.....11. *T. diaguitensis.*

13. Inflorescence lax: floral bracts much less than twice as long as the internodes.
39. Plant large, long-caulescent: sepals ca. 20 mm. long. Mexico.....16. *T. albida.*
39. Plant small, short-caulescent: sepals ca. 9 mm. long. Peru, Bolivia, Brazil, Paraguay, Uruguay, Argentina..24. *T. loliacea.*
9. Floral bracts and flowers spreading at anthesis. Ecuador, Peru.....20. *T. caerulea.*
8. Inflorescence 1–2-flowered, sessile. Venezuela. 17. *T. Funckiana.*
7. Scape-bracts not more than 2: scape exposed for most of its length.
40. Floral bracts glabrous: stem not over 6 cm. long.
41. Floral bracts prominently nerved: scape-bracts one or none. Argentina.....25. *T. erecta.*
41. Floral bracts even: scape-bracts 2. Bolivia, Argentina.....26. *T. funebris.*
40. Floral bracts densely appressed-lepidote: stem up to 20 cm. long. Argentina.....36. *T. andicola.*
6. Leaves not more than 15 mm. long: plant resembling a coarse moss or a *Lycopodium.*
42. Scape bracteate throughout: inflorescence usually of several flowers. Bolivia, Brazil, Paraguay, Argentina.....27. *T. tricholepis.*
42. Scape naked when present or with 1–2 bracts: inflorescence always 1-flowered.
43. Floral bract 1-nerved: leaf-sheaths 3-nerved. Peru, Bolivia, Argentina.....28. *T. bryoides.*

43. Floral bract several-nerved: leaf-sheaths 4–many-nerved.
44. Leaves erect: inflorescence distinctly scapose in most cases. Argentina.....29. *T. aizoides.*
44. Leaves spreading to recurved: inflorescence subsessile. Argentina.....30. *T. angulosa.*

5. Leaves distichous.
45. Floral bracts 4–5 cm. long. Argentina...11. *T. diaguitensis.*
45. Floral bracts ca. 2 cm. long at most.
46. Stem rarely over 2 dm. long, wholly concealed by the imbricate leaf-sheaths.
47. Leaf-blades narrowly triangular, mucronate, usually well over 2 mm. in diameter.
48. Leaves spreading or recurved.
49. Leaves rarely more than 2 cm. long: scape not over 4 cm. long.
50. Floral bracts and sepals prominently nerved, floral bracts densely lepidote. Argentina.....30. *T. angulosa.*
50. Floral bracts and sepals nearly or quite even, not more than scantly lepidote. Argentina.....31. *T. rectangula.*
49. Leaves 2–30 cm. long: scape often elongate.
51. Floral bracts glabrous.
52. Floral bracts and sepals even: leaf-blades strongly angled. Bolivia, Argentina.....26. *T. funebris.*
52. Floral bracts and sepals prominently nerved: leaf-blades terete. Argentina. 32. *T. Castellani.*
51. Floral bracts densely lepidote.
53. Leaves tomentose-lepidote. Bolivia, Brazil, Uruguay, Argentina....21. *T. crocata.*
53. Leaves appressed- or slightly pruinose-lepidote.
54. Stem not over 10 cm. long, usually shorter than the leaves.
55. Leaf-blades laterally compressed: leaf-sheaths indistinct, but little broader than the blades, enfolding the stem only by their extreme base. Peru, Bolivia, Argentina. 33. *T. Gilliesii.*
55. Leaf-blades terete: leaf-sheaths distinct, much broader than the blades, enfolding the stem for most of their length.
56. Sepals equally subfree: scape usually elongate. Bolivia, Uruguay, Argentina.....34. *T. myosura.*
56. Sepals much connate posteriorly: scape 55 mm. long at most. Argentina.....35. *T. retorta.*
54. Stem 20 cm. long, many times longer than the leaves: sepals connate posteriorly. Argentina.....36. *T. andicola.*

48. Leaves erect: sepals connate posteriorly: scape naked. Peru, Bolivia, Paraguay, Argentina, Chile.....39. *T. capillaris.*

47. Leaf-blades linear, usually obtuse, not over 2 mm. in diameter.

57. Sepals free or equally short-connate.

58. Floral bracts glabrous or scantly lepidote, at most barely longer than the internodes. Bolivia, Paraguay, Uruguay, Argentina. 22. *T. bandensis.*

58. Floral bracts densely lepidote, twice as long as the internodes or the inflorescence 1-flowered.

59. Sepals lepidote: 2 or 3 scape-bracts immediately below the first floral bract: stem up to 2 dm. long. Peru, Chile. 37. *T. Landbeckii.*

59. Sepals glabrous, or if lepidote, then only a single scape-bract immediately below the first floral bract.

60. Sepals 12.5 mm. long: petal-blades suborbicular, 6.5 mm. broad, blue or violet. Brazil.....23. *T. Mallemontii.*

60. Sepals not more than 9 mm. long, (much shorter within the range of *T. Mallemontii*): petal-blades narrowly elliptic, pale violet or white. Southern United States to Argentina...38. *T. recurvata.*

57. Sepals connate posteriorly: scape without bracts or absent. Peru, Bolivia, Paraguay, Argentina, Chile.....39. *T. capillaris.*

46. Stem several meters in length, exposed between alternating bunches of leaves. Southern United States to Argentina and Chile.....40. *T. usneoides.*

4. Plant acaulescent: leaves often ligulate.[1]

3. Inflorescence compound.[1]

1. Spikes with flowers polystichous.[1]

1. **Tillandsia** (§ **Allardtia**) **cauligera** Mez. Plant 45 cm. long: stem simple so far as known, at least 6 dm. long, 5–7 mm. thick: leaves densely polystichous, 21 cm. long, cinereous, densely pruinose-lepidote; sheath 30–45 mm. broad, ovate but merging indistinguishably into the blade, half as long as the blade; blades suberect or slightly secund, triangular, acuminate, rigid, apex often uncinate-recurved, margin undulate: scape distinct, terminal, erect, 3–25 cm. long, from shorter than to much exceeding the leaves; its bracts numerous, densely imbricate, striate-nerved, densely lepidote, the median and lower ones foliose and more or less laminate, the upper ones acute or apiculate and thinner, often bright red: inflorescence usually simple and distichous, occasionally a small second spike;

[1] To be treated in later articles.

primary bract when present shorter than the spike and resembling the scape-bracts; spike lanceolate or linear-lanceolate, acute, complanate, 8–9 cm. long, densely 10–14-flowered; rhachis slightly flexuous, strongly 4-angled, glabrous; floral bracts erect, densely imbricate, 3–4 times as long as the internodes, completely concealing the rhachis, ovate, narrowly obtuse, 20–25 mm. long, exceeding the sepals, not at all carinate, uniformly chartaceous, reddish, lepidote on the apex and margins, striate: flowers short-pedicellate; sepals elliptic, broadly acute or obtuse, 18 mm. long, chartaceous, striate, coarsely sparse-lepidote soon becoming glabrous, connate posteriorly for 3 mm.; petals 37 mm. long, blue, drying violet; stamens and style included.—Saxicolous; Peru.—Mez in Fedde Rep. Spec. Nov. iii. 42 (1906); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 119 (1930).—SALVAJINA; OQUENHUEYCONTOY.—Pl. III, fig. 1.

PERU: CAJAMARCA: Hacienda La Tahona, near Hualgayoc, alt. 2600 m., *Weberbauer 4050* (B, TYPE; phot. G); JUNIN: between Tarma and Palca, alt. 2700–3000 m., *Weberbauer 2415* (B); Tarma, alt. 3000–3200 m., 1929, *Killip & Smith 21803* (G, FM, US); CUZCO: Ollantaytambo, alt. 3000 m., 1915, *Cook & Gilbert 568; 785* (US); Cuzco, alt. 3000–3600 m., 1923, *Herrera* (US).

2. **Tillandsia** (§ **Allardtia**) **Macbrideana** L. B. Smith. Plant over 3 dm. long: roots present: stem much branched, also sending out slender stolons with reduced leaves: leaves polystichous, densely imbricate, 3–4 cm. long, densely appressed-lepidote, cinereous; sheath broadly elliptic, 15–20 mm. wide, scarcely distinct from the blade and over half as long; blade triangular, acuminate, recurved near apex: scape lacking: inflorescence terminal, simple and distichous, lanceolate, acute, up to 4 cm. long, 15 mm. broad, 5–10-flowered; rhachis nearly straight, glabrous, sulcate, excavated next the flowers; floral bracts erect, imbricate, 3–4 times as long as the internodes but so narrow as to expose most of the rhachis at anthesis, lanceolate, broadly acute or obtuse, 2 cm. long, exceeding the sepals, not at all carinate, closely striate, submembranaceous, at first densely appressed-lepidote, later glabrous, chartaceous, rose: flowers subsessile; sepals narrowly lanceolate, strongly carinate, glabrous, striate, connate posteriorly for 5 mm.; petals 25 mm. long, narrowly elliptic, obtuse, rose; stamens slightly longer than the style, emerging from the throat of the corolla but shorter than the petals, anthers very narrow, 7 mm. long, filaments straight; ovary 3 mm. long, ovoid: fruit not known, possibly not developed and the species propagating solely by stolons. —Saxicolous; Peru.—L. B. Smith in Contrib. Gray Herb. lxxxix. 11, t. 2, figs. 1–3 (1930).

PERU: HUANUCO: on eastern face of rock cliffs, Llata, alt. 2100 m., *Macbride & Featherstone 2258* (FM, TYPE; G, COTYPE).

The single old and withered inflorescence at hand shows no evidence of capsules, indicating that the species probably reproduces vegetatively but has not gone so far as *T. Werdermannii* in changing the flower.

In publishing this species I noted the fact that the stamens exceeded the style, and stressed it as indicating some affinity with the section *Anoplophytum*. Since then I have found that this character is of no value in distinguishing *Anoplophytum* from *Allardtia*, and that the really valid distinction of *Anoplophytum* is its transversely plicate filaments.[1]

3. **Tillandsia** (§ **Allardtia**) **Friesii** Mez. Plant distinctly caulescent: stem ca. 15 cm. long, decumbent-ascending: leaves densely polystichous, not at all secund, up to 7 cm. long; sheaths oblong-elliptic, glabrous and enfolding the stem only at the extreme base; blades narrowly triangular, acuminate, 7–9 mm. broad, stiff, complicate toward apex, coarsely cinereous-lepidote throughout, subpruinose, sometimes blackish: scape lacking: inflorescence terminal or axillary, simple, dense, not more than 6-flowered, sessile and about equaling the leaves, sublanceolate, complanate, up to 5 cm. long and 1 cm. broad, glabrous throughout; rhachis slightly flexuous, angled; floral bracts erect, imbricate but so narrow as to expose the rhachis, ovate, broadly acute, ca. 17 mm. long, exceeding the sepals, somewhat rigid, even and slightly lustrous, ecarinate, bright red: flowers subsessile, erect, ca. 20 mm. long; sepals lanceolate, acute, 13 mm. long, chartaceous, even or faintly nerved, free; petals purple (Fries!), bright red when dry, obtuse, forming a slightly flaring tube; stamens included, shorter than the pistil.—Saxicolous; northern Argentina.—Mez in Fedde Rep. Spec. Nov. iii. 37 (1906). Pl. II, fig. 11.

ARGENTINA: SALTA: Tambo in Quebrada del Toro, alt. 3000 m., *R. E. Fries 828* (S, TYPE; phot. G).

4. **Tillandsia** (§ **Allardtia**) **caulescens** Brongn. Plant up to 45 cm. long: roots present even in age: stem much branched, up to 30 cm. long: leaves very numerous, densely polystichous, rigid, strict or arching and secund, 10–15 cm. long, densely appressed- or subpruinose-lepidote throughout; sheath subtriangular, several times shorter than the blade; blade narrowly triangular, ca. 5 mm. broad at base, acuminate, involute, pungent, usually with a strong median ridge below: scape distinct to almost none, usually much obscured by the leaves,

[1] L. B. Smith in Ostenia, 360 (1933); Proc. Am. Acad. lxviii. 149 (1930).

terminal, straight or curved; its bracts densely imbricate, the lower ones foliose, the upper ones elliptic, acute or apiculate, nerved, roseate, more or less lepidote: inflorescence always simple and distichous, linear or lance-linear in outline, acute, strongly complanate, up to 14–flowered, 5–7 cm. long, 10–12 mm. wide; rhachis slightly geniculate, strongly 4-angled, glabrous; floral bracts erect, densely imbricate, over 3 times the length of the internodes, but partially exposing the rhachis, ovate-lanceolate, acute, 15–20 mm. long, exceeding the sepals, convex, not at all carinate, subcoriaceous, faintly nerved, glabrous, roseate: flowers subsessile, 25 mm. long; sepals lanceolate, acute, 15 mm. long, glabrous, even or faintly nerved, equally subfree or connate posteriorly up to 3 mm.; petals lingulate, white, spreading at anthesis; stamens emerging from the throat of the corolla, shorter than the style; ovary ovoid-pyramidal.—Peru, Bolivia.—Brongn. ex Bak. Brom. 168 (1889); Mez in DC. Mon. Phan. ix. 811 (1896); F. L. Herrera, Est. Fl. Dep. Cuzco, 76 (1930). Pl. II, fig. 4.

PERU: Cuzco: near Ollantaitambo, province of Urubamba, alt. 2900 m., 1925, *F. L. Herrera 825* (US, G, FM); Indefinite: *C. Gay 1186* (P, type; phot. G); Quebrada Versalles, *A. Diehl 2451* (FM). BOLIVIA: La Paz: vicinity of Bopi River Valley, alt. 1000 m., 1921, *Rusby 670* (NY); vicinity of Huachi, head of Beni River, alt. 600 m., 1921, *O. E. White 536* (NY); same, alt. 500 m., *O. E. White 1068* (NY, phot. G).

5. **Tillandsia** (§ **Allardtia**) **dura** Bak. Plant 2–4 dm. long: roots present even in age: stem almost always simple, from very short to about 14 cm. long: leaves very numerous, polystichous, strict or somewhat arching and often secund, 15–23 cm. long, densely and finely appressed-lepidote throughout, becoming subglabrous above with age, chestnut-brown for the entire length of the sheath and much of the blade, the remainder pale gray-green in the dried material; sheath ovate, scarcely more than 1 cm. long, passing imperceptibly into the blade; blade narrowly triangular, up to 11 mm. broad at base (Mez!) but usually much narrower, rigid, subulate-acuminate: scape distinct but usually much obscured by the leaves, terminal, slender, erect or ascending; its bracts many, densely imbricate, ovate, thin, densely and finely appressed-lepidote, the median and lower ones with stiff leaf-like blades: inflorescence always simple and distichous, the spike linear, acute, strongly complanate, 14–26-flowered, 7–13 cm. long, 10–14 mm. wide; rhachis slightly geniculate, sulcate, angled, distinctly excavated next the flowers, glabrous; floral bracts erect, strongly imbricate, often 3 times the length of the internodes, but so narrow as partially to expose the rhachis, ovate, acute, apiculate,

17–20 mm. long, exceeding the sepals, subchartaceous, strongly nerved, densely appressed-lepidote toward apex, grooved at base, rounded or carinate toward apex, straight or slightly incurved: flowers subsessile; sepals free or equally short-connate or at times the posterior ones connate for about half their length, 8–11 mm. long, oblong-lanceolate, acute, strongly nerved, glabrous, the posterior ones carinate; petals lingulate, blue, 17 mm. long; stamens included, anthers linear, acute, 5 mm. long, dorsifixed 1/4–3/5 of their length from the base; pistil exceeding the stamens, ovary slenderly ovoid.—Saxicolous and epiphytic; Brazil.—Bak. Brom. 168 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 584, t. 108 (1894); Mez in DC. Mon. Phan. ix. 811 (1896); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 119 (1930). *T. linearis* Vell. sensu Wawra, Oesterr. Bot. Zeitschr. xxx. 221 (1880); It. Sax.-Cob. i. 174 (1883), non Vell. (1825).

BRAZIL: Federal District: Rio de Janeiro, Pico da Tijuca, *Glaziou 16460* (K, type; phot. G); 1929, *L. B. Smith 2126* (G, S, B); *Wawra II, 223* (Mez!); *Binot* (Mez!); Rio de Janeiro, Serra da Carioca, alt. 460–720 m., 1928, *L. B. Smith 1280* (G, FM, US, K, BM); São Paulo: on trees by shore, São Vicente, Santos, 1875, *Mosén 3716* (S, phot. G); Ribeirão Pires, 1894, *Edwall in hb. S. P. 12390* (G, SP); epiphytic in matto, Estação Biologica, Alto da Serra, alt. 800–900 m., 1929, *L. B. Smith & J. King 1933* (G).

In *Tillandsia* as a rule the character of sepal fusion is a fairly constant and reliable one, but in *T. dura* it fails to hold. The *Edwall* specimen, while closely simulating the rest of the material in all other regards, has the posterior sepals fused for about half their length. All other numbers have the sepals nearly or quite free.

*T. dura* seems to be more nearly related to *T. caulescens* than to any other species. It resembles *T. caulescens* quite closely in habit and dimensions but has the floral bracts densely lepidote instead of glabrous.

6. **Tillandsia** (§ **Allardtia?**) **Werdermannii** Harms. Plant at least 5 dm. long, probably much longer: roots lacking (Werdermann!): stem procumbent, at least 2 dm. long, much branched, some of the branches or axillary shoots apparently breaking away and serving to propagate the species vegetatively: leaves densely polystichous, 15–20 cm. long, densely cinereous-lepidote, subpruinose; sheaths barely discernible, mostly less than 3 cm. long; blades suberect, narrowly triangular, 10–15 mm. broad at base, channeled, involute-subulate, rigid, often somewhat contorted: scape terminal, 20–30 cm. long or more, ca. 4 mm. thick, glabrous; its bracts erect, numerous, densely imbricate, lanceolate, acute or acuminate, 5–8 cm. long, subcoriaceous, nerved, appressed-lepidote: inflorescence simple and distichous, 25 cm.

long combined with the scape from which it is difficult to distinguish it in the extremely old material at hand, linear, ca. 2 cm. broad; rhachis flexuous, strongly flattened and angled, glabrous; floral bracts like the scape-bracts but glabrous, ca. 4 cm. long, 3–4 times as long as the internodes, much exceeding the sepals, erect, densely imbricate, completely concealing the rhachis, not at all carinate: flowers very short-pedicellate; sepals free, linear-lanceolate, broadly acute, 22–25 mm. long, glabrous; petals many and stamens and pistil aborted as apparent beginning of viviparous flower.—Terrestrial; Chile.—Harms in Notizbl. x. 218 (1928).—Pl. III, fig. 4.

CHILE: TACNA: above Tacna, alt. 800–1200 m., 1925, *Werdermann 717* (B, TYPE; G, Mun, FM, Mo).

A single flower found on the Gray specimen is quite evidently infertile, indicating that the species has adapted itself to its environment along the same lines as has *T. latifolia* in coastal Peru.

Werdermann's informative note made at the time of collection may be translated as follows: "Lying loose on the ground, without roots and with only last year's or isolated very young and undeveloped inflorescences. Forming large pure stands, so that the masses on the pure sand appear gray from a long distance."

7. **Tillandsia** (§ **Allardtia**) **Cardenasii** L. B. Smith (see p. 154). Caulescent, flowering plant 20–25 cm. high: stem up to 1 dm. long, simple: leaves erect or suberect, densely polystichous, up to 2 dm. long; sheaths ovate, 5 mm. long, glabrous, chartaceous; blades linear-triangular, filiform-acuminate, 8 mm. wide at base, densely villous-lepidote with basally produced cinereous scales, involute: scape erect, 1 mm. in diameter, glabrous, sulcate; scape-bracts lanceolate, exceeding the internodes, dark purple, appressed-lepidote, the lowest foliaceous-laminate: inflorescence slightly exceeded by the leaves, simple, densely 4–7-flowered, lanceolate in outline, complanate, 5 cm. long, 1 cm. wide; floral bracts like those of the scape but glabrous, densely imbricate, submembranaceous, not at all carinate, up to 27 mm. long, exceeding the sepals: flowers known only in immature or in fruiting condition, subsessile; sepals free, lanceolate, acuminate, up to 20 mm. long, glabrous, nerved; petals lingulate, lilac (Cardenas!); stamens about equaling the style, slightly shorter than the petals: capsule cylindric, short-beaked, about equaling the floral bracts. Pl. III, figs. 5–6.

BOLIVIA: CHUQUISACA: rocky places, Cerro Macho, alt. 2730 m., 1933, *Cardenas 491* (G, TYPE).

8. **Tillandsia** (§ **Allardtia**) **Geissei** Phil. Plant 22–60 cm. high

and probably up to nearly 1 m., acaulescent or very short-caulescent: roots present: stem simple, not over 5 cm. long: leaves polystichous, spreading, 1–3 dm. long, much shorter than the inflorescence, densely appressed-cinereous-lepidote throughout; sheath ovate, many times shorter than the blade and merging imperceptibly with it, the same color as the blade or with a faint brownish tinge; blade narrowly triangular, filiform-acuminate, 7–12 mm. broad at base, soft and relatively thin, usually twisted toward apex: scape terminal, erect, slender, up to 4 dm. long, equaling or exceeding the leaves, glabrous; its bracts numerous, densely imbricate, densely cinereous-lepidote, the lower foliaceous, the upper lanceolate, apiculate, tinged with red like the floral bracts: inflorescence simple and distichous or unequally bifurcate with a lateral spike 12 cm. long; primary bract like the scape-bracts, much shorter than the lateral spike; single or principal spike linear-lanceolate, acute, 8–17 cm. long, 6–14-flowered; rhachis sharply 4-angled, less than 2 mm. thick, slightly flexuous, glabrous; floral bracts erect, imbricate, about 3 times as long as the internodes, concealing the rhachis until after anthesis, lance-ovate, acute, 30–35 mm. long, exceeding the sepals, 12–14 mm. wide, sparsely cinereous-lepidote becoming glabrous with age, not at all carinate, nerved, uniformly chartaceous, brilliantly variegated with red, green and yellow: flowers subsessile; sepals free, lanceolate, obtuse, 25 mm. long, glabrous, thin; petals 30 mm. long, linear with blade scarcely distinct, obtuse, rose-purple; stamens included; ovary slenderly ovoid, stigma short: capsule cylindric, 3–4 cm. long.—Epiphytic; Chile.—R. A. Philippi in Gartenfl. xxxviii. 369, t. 1302, figs. II–IIf (1889); Rev. Hort. lxi. 388 (1889).

CHILE: ANTOFAGASTA: Dept. Taltal, on stems of *Cereus* on ridges in upper part of fertile belt, vicinity of Aguada de Miguel Diaz, ca. 24° 35′ S. lat., 1925, *I. M. Johnston 5320* (G); ATACAMA: on *Cereus*, near Caldera, 1887, *W. Geisse* (Chile, TYPE; phot. G).

It is rather surprising to find this species, with its thin flat leaves and apparent preference for epiphytism, in the arid regions of northern Chile, where types like *T. Werdermannii* are much more to be expected.

9. **Tillandsia** (§ **Allardtia**) **arequitae** André. Flowering plant up to 4 dm. high, often subpulvinate: roots present: stem conspicuous, usually branching several times, decumbent for most of its length, ends of the branches ascending: leaves numerous, erect to recurved, densely polystichous, not at all secund, up to 20 cm. long (Mez!) but generally not much more than half that length, densely cinereous-lepidote throughout, pruinose; sheaths indistinct, densely imbricate, making

the stem appear very stout; blades narrowly triangular, acuminate up to the abruptly acute pungent apex, 15 mm. broad, stout, rigid, keeled below, complicate toward apex: scape erect, conspicuous, ca. 1 dm. long, usually exceeding the leaves; its bracts densely imbricate, narrowly elliptic, acute, greenish stramineous, at least the lower ones lepidote: inflorescence always simple, lanceolate, acute, complanate, up to 10 cm. long without the petals, densely 6–12-flowered; rhachis flexuous, 4-angled, narrowly alate, glabrous; floral bracts erect, densely imbricate and concealing the rhachis, 3 times as long as the internodes, narrowly triangular-ovate, acute, 25–40 mm. long, exceeding the sepals, rather thin, glabrous, slightly nerved, greenish with stramineous nerveless margins, ecarinate: flowers subsessile; sepals linear-lanceolate, obtuse, 21 mm. long, submembranaceous, glabrous, equal, free; petals ca. 5 cm. long, white, odorless, claw linear, blade spreading, suborbicular, ca. 18 mm. wide, obscurely crenate or entire; stamens elongate, barely included or exserted from the throat of the corolla, shorter than the pistil, anthers linear, 7 mm. long; pistil exserted, ovary prismatic: capsule not known.—Terrestrial and epiphytic; Uruguay.—André ex Mez in DC. Mon. Phan. ix. 814 (1896); Herter, Florula Urug. 45 (1930); Harms in Engl. & Prantl, Nat. Pflanzenf. xv a. 119 (1930). *T. xiphioides* var. *arequitae* André in Rev. Hort. lxv. 156, cum icon. (1893).

URUGUAY: MINAS: *Arechavaleta 2613 bis; Gibert; Tweedie 1120* (Mez!); Cerro de Arequita, 1890, *André K 320* (K, TYPE; G, FM).

In Osten's herbarium there is a plant collected in Paraguari, Paraguay, by Rojas, which is very close to this species. However, the petals are blue and the scape very short, and Sr. Osten informs me that the data on the label is not wholly reliable. Consequently I am waiting for more material to appear before noting a range extension for *T. arequitae* or describing the Rojas plant as a novelty.

I am much indebted to Sr. Osten for a series of photographs illustrating this species in general growth and in detail.

10. **Tillandsia** (§ **Allardtia**) **xiphioides** Ker-Gawl. Flowering plant from 15 to over 30 cm. high: roots present: stem from very short to 15 cm. long, simple or few-branched: leaves numerous, polystichous but sometimes almost distichous, erect to spreading, more or less curved or contorted, up to 25 cm. long but often very much shorter, densely cinereous- or ferrugineous-lepidote throughout, pruinose; sheaths large, densely imbricate, making the stem appear 1–2 cm. thick, passing imperceptibly into the blade; blade narrowly triangular, subulate-acuminate, flat and up to 2 cm. wide at base:

scape from practically none to 12 cm. long but always much obscured by the upper leaves, erect; its bracts elliptic-oblong, densely imbricate and completely concealing the scape, thin, the lower ones caudate and lepidote, the upper apiculate and nearly or quite glabrous: inflorescence always simple and distichous, lance-oblong, acute, up to 12 cm. long without the petals, 2–10-flowered; rhachis up to 3 mm. thick, 4-sided, narrowly alate, flexuous, glabrous; floral bracts densely imbricate, usually several times longer than the internodes, lance-oblong, acute, up to 7 cm. long, much exceeding the sepals, ca. 14 mm. wide, submembranaceous, prominently nerved with a broad scarious nerveless margin, glabrous or sometimes the lower ones sparsely lepidote, stramineous or suffused with red or violet, ecarinate: flowers sessile, erect, up to 10 cm. long; sepals linear-lanceolate, acuminate, up to 42 mm. long, free, glabrous, submembranaceous, prominently nerved; petals white, fragrant, claw linear, blade broadly elliptic, obtuse, spreading, ca. 2 cm. wide, conspicuously crenate-serrate; stamens elongate, barely included or exserted from the throat of the corolla, shorter than the pistil and much shorter than the petals, filaments filiform, straight, anthers linear, 8 mm. long; pistil exserted, style slender, ovary slenderly prismatic: capsule stout, abruptly short-beaked, 3 cm. long.—Saxicolous and epiphytic; Bolivia, Uruguay and northern Argentina.—Ker-Gawl. in Bot. Reg. ii. t. 105 (1816); Spreng. Syst. ii. 23 (1825); R. & S. Syst. vii. 1200 (1830); Hook. in Bot. Mag. xcii. t. 5562 (1866); Benth. & Hook. Gen. iii. 670 (1883); Bak. Journ. Bot. xxv. 214 (1887); Brom. 164 (1889); Mez in DC. Mon. Phan. ix. 813 (1896); Kuntze, Rev. Gen. iii. 304 (1898); Hicken, Chloris Plat. 62 (1910); Memmler in Gartenwelt, xvii. 718 (1913); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 248 (1917); Herter, Florula Urug. 45 (1930); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 119 (1930); Castellanos, Brom. & Cact. in Physis, x. 90 (1930); Brom. Arg. iii., in An. Mus. Nac. Hist. Nat. B. A. xxxvi. 375 (1931); iv., in xxxvii. 509 (1933). *Anoplophytum xiphyoides* Beer, Brom. 254 (1857), nomen. *Tillandsia macrocnemis* Griseb. Symb. Argent. in Goett. Abh. xxiv. 332 (1879); Spegazzini, Fungi Argent. 322 (1899). *T. xiphoides* E. Morr. ex Wittm. in Engl. & Prantl, Nat. Pflanzenf. ii. Abt. 4, 57 (1888). *T. odorata* Gill. ex Bak. Journ. Bot. xxv. 214 (1887), in synonymy. *T. sericea* Hort. ex Bak. ibid. *T. suaveolens* Lem. ex Bak. ibid. *Phytarhiza xiphioides* E. Morr. ex Bak. ibid. *T. unca* Griseb. sensu Hicken, Physis, i. (1912), non Griseb. (1874). *T. Friesii* Mez sensu Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 501, t. 1 (1933), non Mez (1906).—FLOR DEL AIRE (Argentina).

BOLIVIA: Potosi: prov. Nor-Chichas, on rocks near San Antonio, 1931, *Cardenas 93* (G). URUGUAY: San José: on rocks, Sierra de Mahama, *Larriera* (Ost, phot. G). ARGENTINA: Jujuy: Volcan, 1927, *Castillon 6613* (Castellanos!); Salta: *Rodriguez 6610* (Castellanos!); Cafayate, 1913, *Rodriguez 1252* (G, BA); Tucuman: La Hoyada, 1920, *Schreiter 1377* (G, BA); Las Arcas, 1920, *Schreiter 1099* (Castellanos!); near Baco, dept. Trancas, alt. 900 m., 1920, *Venturi 1316* (Ost); Sierra de la Candelaria, dept. Trancas, alt. 950 m., 1924, *Venturi 2495a* (G); dept. Tafi, Colalao del Valle, 1931, *Schreiter 7176* (Castellanos! as *T. Friesii* emend.); Catamarca: Piedra Blanca, 1908, *Castillon 6612* (Castellanos!); Andalgalá, 1915, *Jörgensen 6611* (Castellanos!); 1916, *1105* (Castellanos!); Santiago del Estero: 1913, *Wagner* (Castellanos!); La Rioja: Los Llanos, 1895, *Bodenbender* (Castellanos!); Sierra Velasco near La Rioja, *Hieronymus & Niederlein 9* (Mez!); San Juan: 1904, *Spegazzini* (Castellanos!); Córdoba: near Córdoba, 1879, *Lorentz 123* (G, BM); *Hieronymus 912* (US, FM); *423; Kurtz 1153; 4822* (Mez!); 1891, *Kuntze* (NY); Rio Primero, Sierra de Córdoba, 1874, *Hieronymus* (NY); Dean Funes, 1916, *Sanzin 1156* (Ost); Los Paredones near Capilla del Monte, Sierra Chica, alt. 1000 m., 1918, *Osten 13465* (Ost); 1923, *Osten 17114* (Ost); Sierra Grande, Cerro Áspero, 1922, *Castellanos 1204* (Castellanos!); San Luis: Sierra del Morro, 1913, *Pastore* (Castellanos!); Mendoza: near Mendoza, 1825, *Gillies* (G, BM, Cam); 1879, *Miers 640* (BM); Cacheuta, 1913, *Sanzin 276* (Ost).

According to Castellanos all reports of this species from Buenos Aires are based on introduced material.

The type can not be located at Kew, the British Museum or Cambridge and it seems probable that no specimen was preserved. Fortunately the plate accompanying the original description is unmistakable.

11. **Tillandsia** (§ **Allardtia**) **diaguitensis** Castellanos. Plant much slenderer and more elongate than either *T. xiphioides* or *T. arequitae:* stem up to 6 dm. long, 5 mm. in diameter, simple or few-branched: leaves evenly and laxly polystichous along the stem or distichous (Castellanos!), 8–10 cm. long, densely cinereous-lepidote throughout, furfuraceous; sheaths elliptic, amplexicaul, ca. 13 mm. wide, imbricate, making the stem appear 7–10 mm. thick; blades erect to recurved, narrowly triangular, acuminate, ca. 6 mm. wide, strongly nerved when dry, channeled along the upper face: scape terminal, conspicuous, up to 8 cm. long; its bracts imbricate and concealing it, elliptic, acute, thin, stramineous, strongly nerved, lepidote toward apex: inflorescence always simple, spike lanceolate, acute, 4–9 cm. long, 14 mm. broad, densely 3–6-flowered; rhachis slender, nearly straight, glabrous, strongly sulcate; floral bracts imbricate, 2 to 3 times as long as the internodes, lanceolate, acute, 4–5 cm. long, much exceeding the sepals, chartaceous and strongly nerved with a scarious nerveless margin, glabrous, roseate: pedicels 3 mm. long; sepals oblong-lanceolate, acute, 32 mm. long, membranaceous, strongly nerved, glabrous, free: petals ca. 7 cm. long, white or bluish, fragrant,

claws linear, forming a tube well beyond the sepals, blades spathulate, minutely denticulate; stamens 51 mm. long including the 8 mm. long anthers, exserted from the throat of the corolla; pistil 55 mm. long, ovary 7 mm. long, stigma 3-parted: capsule equaling or shorter than the floral bracts.—Saxicolous and epiphytic; northwestern Argentina. —Castellanos, Brom. Arg. ii., in An. Mus. Nac. Hist. Nat. B. A. xxxvi. 55, t. 10 (1929); iv., in xxxvii. 501 (1933).

ARGENTINA: JUJUY: Volcán, 1920, *Castillon 7224* (hb. Castellanos, TYPE); SALTA: dept. San Carlos, Quebrada de Amblayo, 1927, *Schreiter 6585* (Castellanos!); TUCUMAN: dept. Tafi, Las Arcas to Tiopunco, 1917, *Schreiter 809* (Ost); Las Arcas, 1927, *Schreiter 5524* (Castellanos!); same, alt. 2000 m., *Venturi 8670* (G); dept. Trancas, Cadillal to Tapia, alt. 700 m., 1920, *Venturi 1395* (US).

Castellanos describes the leaves as distichous but illustrates them as polystichous. In all the material that I have seen so far they are far from distichous also.

12. **Tillandsia** (§ **Anoplophytum**) **argentina** C. H. Wright. Often pulvinate, flowering plant up to 13 cm. high: stem short but usually distinct, simple or few-branched, up to 8 cm. long (Mez!): roots present: leaves densely polystichous, often secund-curved, up to 13 cm. long but the lower ones much reduced; sheaths triangular, merging imperceptibly into the blades, thin, at least the lower half glabrous and lustrous; blades erect or suberect, very narrowly triangular or linear, abruptly acute, pungent, rigid, channeled above, obtusely carinate below, angular-subulate, 3–6 mm. wide: scape from practically none to 6 cm. long, exceeded by the leaves, erect or ascending, glabrous; its bracts imbricate and concealing it, lanceolate, acuminate, stramineous, chartaceous, strongly nerved, glabrous: inflorescence always simple, broadly lanceolate or oblanceolate, strongly complanate, up to 45 mm. long and 15 mm. wide, 4–7-flowered, glabrous throughout; rhachis nearly straight, strongly 4-angled; floral bracts lanceolate, acuminate, up to 25 mm. long, exceeding the sepals, subcoriaceous, even or somewhat nerved, ecarinate, red, sublustrous: flowers erect, subsessile; sepals narrowly lance-triangular, acuminate, 12–18 mm. long, free, subequal; petals narrow with scarcely distinct suberect to spreading blades, ca. 30 mm. long, obtuse, entire, bright rose-red; stamens ca. 20 mm. long, deeply included, shorter than the pistil, filaments thickened and transversely plicate, anthers linear, 5 mm. long; ovary subprismatic: capsule 20 mm. long, cylindric, beaked.—Saxicolous and epiphytic; northern Argentina.— Kew Bull. 60 (1907). *T. unca* Griseb. sensu Bak. Journ. Bot. xxv. 234 (1887); Brom. 165 (1889); Mez in DC. Mon.

Phan. ix. 812 (1896); Kuntze, Rev. Gen. iii. 304 (1898); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 248 (1917); Castellanos, Brom. Arg. i., in Com. Mus. Nac. Hist. Nat. B. A. ii. 144 (1925); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 119 (1930); Castellanos, Brom. Arg., iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 508 (1933), non Griseb. (1874).—Pl. II, figs. 5–7.

ARGENTINA: JUJUY: dept. Ledesma, Sierra de Calilagua, alt. 750 m., 1927, *Venturi 5359* (US); SALTA: dept. Guachipas, Alemania, alt. 1300 m., 1929, *Venturi 9978* (G); TUCUMAN: dept. Capital, Barranca Colorada, alt. 550 m., 1920, *Venturi 993* (Ost, BA); dept. Famailla, Rio Leales, alt. 450 m., 1923, *Venturi 2494* (G); Rio Lules, alt. 450 m., 1923, *Schreiter 797 in part* (Ost); Tapia, Cadillal, alt. 500 m., 1918, *Schreiter 797 in part* (Ost); Tapia, 1920, *Venturi 1033* (US); CÓRDOBA: Cosquin to Santa Maria, Sierra de Córdoba, *Hieronymus 346* (FM); Sierra de Córdoba, *Berg* (Mez!); *Hieronymus* (NY, BM); north of Cuesta de Copina, Sierra Achala de Córdoba, 1878, *Hieronymus* (NY); Desempeñadero to San Roque, 1881, *Hieronymus* (US, NY, phot. G); Ochoa, Punilla, 1903, *Stuckert* (K, TYPE; phot. G); Los Paredones near Capilla del Monte, Sierra Chica, alt. 1000 m., 1918, *Osten 13464* (Ost); Rio Pintos, Sierra Chica, alt. 1000 m., 1918, *Osten 13492* (Ost); CATAMARCA: Cuesta de Chilca, *Lorentz 252* (Mez!).

Baker, Mez, Castellanos and Harms have all considered this species as identical with *T. unca* Griseb., but none of them cite the type of *T. unca* and I have not been able to locate it as yet either. However, there is ample evidence in the original description to prove that true *T. unca* is nearly related to if not identical with *T. pulchella* Hook.

*Venturi 1315* from Barranca Colorado, Tucuman, combines the characters of *T. argentina* and of *T. ixioides*, which have both been collected from that locality. The hybridizing of *T. argentina* with a species of *Anoplophytum* and its possession of plicate filaments make it seem logical to include it in that section. Such action means that *Anoplophytum*, like *Allardtia* and *Platystachys*, must include both simple distichous and simple polystichous types of inflorescence and must be characterized by the form of its filaments.

13. **Tillandsia** (§ **Anoplophytum**) **incarnata** HBK. Plant attaining a length of 65 cm. and probably much more (no complete specimens have been seen in herbaria), growing in dense masses (André! Lehmann!): roots not noted, probably lacking: stem branching, attaining at least 4 dm.: leaves densely polystichous, 8–18 cm. long, densely cinereous-lepidote, scales appressed or slightly pruinose; sheath ovate, scarcely distinguishable from the blade and several times shorter, sometimes tinged with brown; blades suberect to spreading, narrowly triangular, filiform-acuminate, 10–17 mm. broad at base, usually involute toward apex: scape terminal, straight or slightly

curving, ca. 2 mm. thick at base, lepidote or glabrous, 1–4 dm. long, much exceeding the leaves; its bracts numerous, densely imbricate, elliptic, chartaceous, densely cinereous-lepidote, roseate, the lower ones with long filiform blades, the upper ones acute or apiculate: inflorescence simple and distichous, lanceolate, acute, 5–9 cm. long, 10–17 mm. wide, complanate, 5–12-flowered, often 1 or 2 sterile flowers at apex; rhachis nearly straight, sharply 4-angled, lepidote; floral bracts erect and imbricate or the lowest slightly divergent, 3–4 times as long as the internodes, elliptic, apiculate, 20–25 mm. long, exceeding the sepals, not at all carinate, chartaceous, densely appressed-lepidote, strongly nerved, roseate: flowers subsessile; sepals elliptic-lanceolate, acute, ca. 14 mm. long, prominently nerved, profusely lepidote, connate posteriorly for about half their length; petals narrowly elliptic, obtuse, 20–25 mm. long, erect or nearly so, rose; stamens distinctly shorter than the petals, filaments dilated above and transversely plicate, anthers 4–5 mm. long, subfiliform, acute, sagittate at base; pistil about equaling the stamens, ovary slenderly ovoid: capsule up to 25 mm. long, subprismatic, abruptly short-beaked, dehiscing to the base.—Terrestrial, saxicolous or epiphytic (André!); Colombia, Ecuador.—Nov. Gen. i. 291 (1816); Spreng. Syst. ii. 24 (1825); R. & S. Syst. vii. 1208 (1830); Dietr. Syn. ii. 1057 (1840); André in Belg. Hort. xxvii. 219 (1877); Wittm. in Engl. Bot. Jahrb. xi. 64 (1889); Bak. Brom. 170 (1889); André, Brom. André, 77 (1889); Mez in DC. Mon. Phan. ix. 809 (1896); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 119 (1930). *Platystachys incarnata* Beer, Brom. 264 (1857). *Tillandsia striata* Willd. ex R. & S. Syst. vii. 1209 (1830), in synon. *T. brevifolia* Bak. in Journ. Bot. xxv. 239 (1887).—Pl. II, figs. 8–10.

COLOMBIA: Norte de Santander: Pamplona, *Funck & Schlim 1479* (BM); between Mutiscua and Pamplona, alt. 2500 m., 1927, *Killip & Smith 19767* (G, US, NY); Cundinamarca: between Bogotá and La Mesa, *Goudot* (Mez!); Facatativa, alt. 2750 m., 1875, *André 604 in part* (K, NY); Salto de Tequendama, alt. 2500 m., 1876, *André 604 in part* (K, NY); 1925, *Schultze 71* (US); Quetame, alt. 100–500 m., 1930, *E. P. Arbelaez 4* (US); Bogotá, alt. 2640 m., *B. G. Amórtegui 175* (US); Nariño: La Galera Volcano, near Pasto, alt. 3200 m., 1876, *André 604 in part* (K). ECUADOR: Imbabura: banks of the Rio Chota, alt. 1670 m., 1876, *André 604 in part* (K, NY); Pichincha: banks of the Rio Guallabamba, 1802, *Humboldt & Bonpland* (HBK!); Valley of Turubamba, between Magdalena and Chillogallo, *Firmin 265* (US, FM); Leon: Cotopaxi, *Wagner 92* (Mez!); Tungurahua: near Ambato, 1802, *Humboldt & Bonpland* (HBK!); dry sterile valleys, near Riobamba, Ambato, Tacunga, Guallabamba, etc., alt. 1800–2300 m., 1880, *Lehmann 147* (US, BM); *147 a* (Mez!); Ambato, *Pearce* (K); same, alt. 2600 m., 1923, *Hitchcock 21705* (G, US, NY); Chimborazo: "province of Riobamba," *Rimbach 121* (G, US); Azuay: between Oña and Cuenca, alt. 2700–

3300 m., 1923, *Hitchcock 21610* (G, US, NY); INDEFINITE: 1855, *Couthouy* (G); interandine highland, alt. 2800 m., 1932, *Rimbach 78* (G).

Mez[1] cites *Humboldt & Bonpland 3138* from S. Felipe, yet a photograph of this number from Paris and another from Berlin-Dahlem disclose no locality at all on the label. The original description[2] reads: "Crescit ad fluvium Guallabamba et prope Hambato Quitensium, . . . ." Sprague[3] lists no S. Felipe in Humboldt's route in Colombia, the country where Mez cites it, but Sandwith[4] lists it in Peru far to the south of the proved range of *Tillandsia incarnata*. Thus there is every indication that Mez's citation is due to some misunderstanding.

It is impossible to tell now to which of the two localities in the original description the type should be assigned. Neither is it evident which of these is represented by the specimen at Paris or by that at Berlin-Dahlem.

As shown by *Rimbach 121*, *Tillandsia incarnata* has filaments that are dilated and transversely plicate near the apex, and for this reason I consider it a member of the section *Anoplophytum* in the same way that *T. argentina* is.

14. **Tillandsia** (§ **Platystachys**) **Ehrenbergiana** Kl. Flowering plant 10–20 cm. high: roots present: stem simple or branched, 3–5 cm. long, much exceeded by the leaves: leaves densely polystichous, up to 15 cm. long, densely cinereous-villous with fine scales which are produced basally into long narrowly triangular lobes; sheaths broadly elliptic, distinct from the blades, the lower part membranaceous, glabrous, strongly nerved; blades mostly spreading or reflexed, involute-subulate, filiform-acuminate, 3 mm. in diameter: scape terminal, erect or ascending, less than 1 mm. in diameter, strongly sulcate, glabrous; its bracts imbricate, involute, much exceeding the internodes, lanceolate, acuminate, thin, strongly nerved, roseate, lepidote, the lower laminate: inflorescence always simple, elliptic, terete to strongly complanate, 35 mm. long, 16 mm. wide, densely 3–8-flowered; rhachis slender, nearly straight; floral bracts imbricate and concealing the rhachis, 3 to 4 times as long as the internodes, lanceolate, acute, 26 mm. long (Mez!), much exceeding the sepals, 8 mm. wide, membranaceous, strongly nerved, roseate, puberulent-lepidote, the upper half distinctly carinate: flowers subsessile; sepals lanceolate, acuminate, up to 17 mm. long, 5 mm. wide, carinate,

[1] Mez in DC. Mon. Phan. ix. 810 (1896).
[2] HBK. Nov. Gen. i. 291 (1816).
[3] Kew Bull. 1926. 23 (1926).
[4] Kew Bull. 1926. 187 (1926).

membranaceous, strongly nerved, lepidote, subfree; petals tubular-erect, probably yellow (Mez!); stamens and pistil exserted (Mez!), ovary ellipsoid: capsule cylindric, acute, 25 mm. long.—Epiphytic; central Mexico.—Kl. ex Bak. Brom. 169 (1889). *T. Ehrenbergii* Kl. ex Beer, Brom. 264 (1857), nomen; Mez in DC. Mon. Phan. ix. 727 (1896); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 118 (1930). *Platystachys Ehrenbergii* Beer, Brom. 264 (1857), nomen.—Pl. III, figs. 7–8.

MEXICO: San Luis Potosi: near San Luis Potosi, alt. 2000–2700 m., 1878, *Parry & Palmer 872* (G, US, Mo); Guanajuato (?): Jaral, *Schumann 1513* (US); Hidalgo (?): Rugla, *Ehrenberg 860* (BM, type; G); Federal District: Valley of Mexico City, *Schmitz 228* (BM); Indefinite: *Christy* (Mez!).

*T. Ehrenbergiana* is the first name for this species to be accompanied by a description and so must stand.

15. **Tillandsia** (§ **Platystachys**) **Schiedeana** Steud. Flowering plant up to 4 dm. long, but usually not much more than 2 dm., often pulvinate: roots present: stem 5–20 cm. long, simple or few-branched: leaves polystichous, varying greatly in density, up to 25 cm. long, densely cinereous- or ferrugineous-lepidote, scales appressed near apex of leaf, pruinose below; sheaths suborbicular, large, densely imbricate and making the stem appear very stout, at least the margin hyaline, glabrous only where covered; blades very narrowly triangular, filiform-acuminate, involute-subulate: scape terminal, erect, shorter than the leaves; its bracts imbricate and concealing it, the lower foliaceous, the upper thinner and usually roseate but usually with a distinct filiform lamina also: inflorescence always simple, distichous or sometimes polystichous at base (Mez!), lanceolate, acuminate at both ends, terete, up to 7 cm. long and 8 mm. in diameter but often less than half as large, densely few-flowered; rhachis nearly straight, slender, strongly sulcate, glabrous; floral bracts densely imbricate and wholly concealing the rhachis, 2–3 times as long as the internodes, elliptic-lanceolate, obtuse or the basal ones minutely apiculate, ca. 30 mm. long and 10 mm. wide, much exceeding the sepals, membranaceous, roseate, strongly nerved, the lower ones appressed-lepidote, the upper ones often glabrous: flowers sessile, up to 46 mm. long; sepals lanceolate, acute, up to 20 mm. long, subcoriaceous, glabrous, even or few-nerved, the posterior ones usually much connate; petals tubular-erect, yellow; stamens and pistil exserted, ovary ellipsoid: capsule cylindric, up to 45 mm. long.—Epiphytic; Mexico and the West Indies to Colombia and Venezuela.—Nomencl. ed. 2, ii. 688 (1841). *T. vestita* Ch. & Schdl. in Linnaea, vi. 52 (1831), non Willd. (1830),

nec Benth.; Schdl. in Linnaea, xviii. 423 (1844); Hemsley, Biol. Centr.-Am. iii. 323 (1884); Bak. in Journ. Bot. xxv. 238 (1887); Brom. 170 (1889); Millspaugh, Field Mus. Pub. i. 12 (1895); Mez in DC. Mon. Phan. ix. 728 (1896); Standley & Calderon, Lista Prelim. Pl. El Salvador, 47 (1925); Standley, Field Mus. Pub. iii. 222 (1930); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 118 (1930). *T. flavescens* Mart. & Gal. in Bull. Acad. Brux. x. pt. 2, 118 (1843). *T. caerulea* HBK. sensu Griseb. in Goett. Nachr. 14 (1865), non HBK. *T. Grisebachii* Bak. in Journ. Bot. xxv. 305 (1887); Brom. 188 (1889). *T. Eggersii* Bak. Brom. 170 (1889).—Xeen (Yucatan); Gallito; Chivito (Salvador).—Pl. III, fig. 9.

MEXICO: Baja California: 1886, *McLellan* (US); San Luis Potosi: near Rascon, 1905, *Palmer 684* (US); Sinaloa: near Labradas, 1925, *Ferris & Mexia 5121 A* (DH); Vera Cruz: Actopan to Jalapa, 1829, *Schiede & Deppe* (B, type; BM); Orizaba, *Botteri 329* (G, US); 1855, *Mueller 1239* (G); 1866, *Bourgeau 2103 in part* (G); 1867, *Bilimek 425* (G); 1885, *Gray* (G); 1894, *Nelson 50 c* (US); 1905, *Purpus 1254* (G, FM, Mo); Cordoba, 1866, *Bourgeau 2103 in part* (G, US); 1884, *Carruthers* (BM); Fortin, 1883, *Kerber 295* (US, BM); near Jalapa, alt. 1200–1300 m., 1899, *Pringle 7793* (G, US); *8063* (G, US, FM, Mo, S, BM); Zacuapan, 1909, *Purpus 3764* (G, US, NY, FM, Mo, UCal, BM); 1919, *Purpus 8216* (UCal); *8221* (G, US, Mo); *8222* (G, US, NY, Mo); Nayarit: Pedro Paulo, 1897, *Rose 3324* (US); Hidalgo: Tatipan to Yahualica, alt. 300–900 m., 1891, *Maury 5956* (G); Jalisco: near Zapotlan, 1893, *Pringle 4376* (G, US, FM, Mo, S, BM); Puebla: valley of the Rio Necaxae near Huauchinango, alt. 1100 m., 1932, *Fröderström & Hultén 826* (S); Morelos: near Cuernavaca, alt. 1600 m., 1898, *Pringle 6860* (G, US, FM, Mo, S, BM); Oaxaca: Totolapa to San Carlos, alt. 1000–1200 m., 1895, *Nelson 2544* (G, US); below Jayacatlan, alt. 1100 m., 1895, *L. C. Smith 550* (G); Tabasco: Tenosique, alt. 60 m., 1892, *Beristain 8014* (G); Campeche: Tuxpeña, 1932, *Lundell 1383* (FM); Yucatan: *Johnson 84* (Mez!); *Gaumer 24422* (G, FM); Merida, 1864, *Schott 161* (BM, FM); Izamal, 1885, *Gaumer 427* (G, FM, Mo, US); 1906, *Greenman 402* (G, FM); Silam, 1885, *Gaumer 664* (G, US, FM, Mo); Quintana Roo: Chichankanab, *Gaumer 1767* (G, US, FM, Mo, DH, S, BM, BA); *1914* (G, US, FM, Mo, S). BRITISH HONDURAS: Toledo, 1907, *Peck 944* (G); El Cayo, 1931, *Bartlett 12906* (G); 1933, *Chanek 115* (G); Rio Grande, 1933, *Schipp S 455* (G, FM). GUATEMALA: Peten: Tikal, 1931, *Bartlett 12651* (G); Vaxactun, 1931, *Bartlett 12287* (G); La Libertad, 1933, *Lundell 2517, 2534* (G); *2592, 3929* (Mich); Izabal: near Quirigua, alt. 75–225 m., 1922, *Standley 24218* (G, US, Mo, S); *24476* (G, US); *24606* (G, US, FM, Mo); Zacapa: Gualan, alt. 130 m., 1905, *Deam 211* (G); Guatemala: Sanarate, 1905, *Kellerman 4731* (US); Mt. San Antonio, alt. 1465 m., 1906, *Kellerman 5910* (US); Jalapa: Jalapa, 1908, *Kellerman 7867* (FM); Amatitlan: Pacaya, 1890, *J. D. Smith 1958* (G, US); Moran, alt. 1205 m., *Kellerman 4898* (US). SALVADOR: Santa Ana: near Santa Ana, alt. 655–900 m., 1922, *Standley 20411* (G, US); Ahuachapán: Sierra de Apaneca near Finca Colima, 1922, *Standley 20210* (G, US, S); Sonsonate: near Izalco, 1922, *Standley 22179* (G, US); near Sonsonate, alt. 220–300 m., 1922, *Standley 21772* (G, US); San Salvador: Tonacatepeque, 1921, *Calderon 217* (US); near San Salvador, 650–850 m., 1922, *Standley 22673* (G, US); 1923, *Calderon 1506* (US). HONDURAS: Cortez: Lake Yojoa, alt. 700 m., 1934, *Yuncker 4901* (FM). NICARAGUA: *Rothschuh 93* (Mez!); *Wright* (G, US); Chinandega: Realejo, 1903, *C. F. Baker 2086* (G, US, Mo, S);

MANAGUA: southwest slopes of Santiago Volcano, near Masaya, alt. 300–480 m., 1923, *Maxon 7673* (US); near Managua, 1932, *Garnier 682* (US); *781* (G, US). COSTA RICA: *Oersted* (Mez!); ALAJUELA: El Coyolar, alt. 240 m., 1924, *Standley 39997*, *40075*, *40078* (US); SAN JOSÉ: La Verbena near Alajuelita, alt. 1000–1200 m., 1898, *Tonduz 8953* (US, Bo); 1924, *Standley 32229* (US); Las Pavas, alt. 1070 m., 1924, *Standley 36108* (US); CARTAGO: Finca Las Concavas, alt. 1200–1300 m., 1925, *Standley 41527* (US); Cartago, alt. 1450 m., 1909, *Biolley 17364* (US); lower Rio Turrialba, 1925, *Stork 2450* (FM). CUBA: PINAR DEL RIO: near Sumidero, *Shafer 13822* (US, FM); SANTA CLARA: Trinidad Mountains, 1910, *Britton, Earle & Wilson 4840* (G, US); Pitajones, 1912, *Shafer 12190* (US, Mo); San Blas, La Sierra, alt. 200–330 m., 1930, *Jack 8040* (G, US, FM, S); 1931, *8207* (US); ORIENTE: Yara to Manzanillo, 1912, *Shafer 12366* (US). JAMAICA: *Bertero; Harris 5223* (Mez!). HAITI: Presqu'ile du Nord-Ouest, Port-de-Paix, near Cordier, 1925, *Ekman 3922* (US); near Anse Galette, Gonave Is., 1920, *Leonard 3116* (US); Dept. du Nord, near St. Raphael, alt. 350 m., 1925, *Leonard 7720* (G, US); Dept. l'Artibonite, near Gros Morne, alt. 235 m., 1926, *Leonard 10017 b* (US); near Mole St. Nicolas, 1929, *Leonard 13306* (US). SAN DOMINGO: *Bertero 463* (Mo); *Picarda 180* (Mez!); Llanos de San Rafael, 1887, *Eggers 1806* (K, type of *T. Eggersii;* BM, US); Prov. Barahona, Duvergé, 1911, *Fuertes 894* (G, US, BM); Azua, 1913, *Rose, Fitch & Russell 3893* (US); Prov. Monte Cristy, Dist. Moncion, 1929, *Valeur 148* (US, FM, Mo, S); same, alt. 300–400 m., 1931, *Valeur 794* (US, S). VENEZUELA: near Biscaina, alt. 1000 m., *Fendler 1533* (K, type of *T. Grisebachii*); ARAGUA: Maracay, *Vogl 1075* (Mun); MERIDA: San Juan to El Vegon, 1928, *Pittier 12852* (US, Mo, Mun). COLOMBIA: MAGDALENA: Santa Marta, alt. 260 m., 1898–9, *H. H. Smith 2348* (G).

After being in constant use for over one hundred years, *Tillandsia vestita* has to be replaced by *T. Schiedeana* because of an earlier homonym.

16. **Tillandsia** (§ **Platystachys**) **albida** Mez & Purpus. Flowering plant up to 4 dm. high: stem elongate, much branched: leaves densely polystichous, 12 cm. long, densely pale cinereous-lepidote; sheaths merging imperceptibly into the blades; blades suberect to squarrose, narrowly triangular, long-acuminate, channeled above but not convolute: scape terminal, erect, short but exceeding the leaves; its bracts densely imbricate, bright red, white-lepidote: inflorescence 13 cm. long, 3 cm. wide, laxly 6-flowered; rhachis undulate, angled, glabrous, bright red; floral bracts erect, not at all imbricate nor concealing the rhachis, elliptic, obtuse, up to 21 mm. long, coriaceous, nearly or quite even with a hyaline margin, ecarinate, especially the lower ones appressed-lepidote: flowers erect, with short stout pedicels, 37 mm. long without the genitalia; sepals obtuse, 20 mm. long, coriaceous, glabrous, even, pale green; petals greenish white, obtuse, tubular-erect; stamens and pistil 5 mm. longer than the petals.—Central Mexico.—Mez & Purpus in Fedde Rep. Spec. Nov. xiv. 248 (1916).

MEXICO: HIDALGO: near Ixmiquilpan, *Purpus* (hb. Mez, TYPE).

The material was originally received at Darmstadt and cultivated there, then sent to Königsberg where Mez studied it.

*Maury 5748* from Cañadade Meztitlan, Hidalgo, Mexico, (FM, G), has nearly the same habit as this species, but its inflorescence is so imperfect that it can not be identified with certainty unless compared with the type, which I have not examined.

17. **Tillandsia** (§ **Platystachys**) **Funckiana** Bak. Plant up to 3 dm. long, pulvinate: roots present: stem branching, 2–3 mm. in diameter: leaves very densely polystichous, scarcely more than 5 cm. long, densely lepidote throughout with appressed cinereous or brownish scales; sheaths distinct, triangular-ovate, ca. 5 mm. long; blades erect to recurved, linear, 1–2 mm. broad at base, filiform-acuminate, strongly keeled below: scape none: inflorescence terminal, consisting of a single flower or rarely two; floral bract lance-oblong, acute, membranaceous, 1-nerved, glabrous, not more than half as long as the sepals: sepals elliptic-ovate, obtuse, ca. 15 mm. long, chartaceous, even, glabrous, free; petals tubular-erect, up to 44 mm. long, red: stamens and pistil exserted.—Terrestrial and epiphytic; Venezuela. —Bak. Brom. 196 (1889); Mez in DC. Mon. Phan. ix. 730 (1896); R. Knuth in Fedde Rep. Spec. Nov. Beiheft, xliii. 189 (1927).—Pl. IV, fig. 1.

VENEZUELA: MERIDA: Laderas de San Pablo near Merida, alt. 500–700 m., *Funck & Schlim 1258* (BM, TYPE; Bo, Gen, P, Leningrad); El Morro, alt. 1750 m., 1911, *Jahn 78* (US); Laderas de San Pablo, Rio Chama, alt. 600 m., 1922, *Jahn 1088* (G, US, NY); between Estanques and Puente Real, San Juan to El Vegon, alt. 400–1100 m., 1928, *Pittier 12846* (US, NY).

Baker described the inflorescence as 2–3-flowered, while actually it is 1- or very rarely 2-flowered. This discrepancy is probably due to his drawing his description partly from *Anoplophytum brachypodium* which he included as nearly allied. Neither does there seem to be any evidence of the large size of the floral bract, 47 mm., as recorded by Mez. Mr. Dandy in a recent letter confirms my opinion that there is no such large bract to be found on the type at the British Museum.

18. **Tillandsia** (§ **Phytarrhiza**) **paleacea** Presl. Flowering plant 1–7 dm. long: roots present at least in the early stages of development: stem up to 35 cm. long and probably much more, much branched, appearing stout because of the leaf-sheaths: leaves polystichous in relatively few rows and rather widely spaced so that the blade and the upper half of the sheath are clearly visible, cinereous, often becoming fuscous with age, densely tomentose-lepidote; sheaths large, broadly ovate or elliptic, glabrous except on the upper half outside; blades abruptly spreading, irregularly contorted in most cases, narrowly triangular, 4–6 mm. broad at base, involute-subulate, up to

12 cm. long: scape slender, erect, from very short to over 15 cm. long, glabrous or nearly so; its bracts mostly equaling or exceeding the internodes, narrowly elliptic, apiculate, lepidote, the lower ones filiform-laminate: inflorescence always simple and distichous, narrowly lanceolate, acute, complanate, up to 5 cm. long, densely 1–12-flowered; rhachis strongly angled, glabrous, practically straight or slightly geniculate; floral bracts imbricate, about 3 times as long as the internodes, ovate or elliptic, 12–17 mm. long, varying from slightly longer to slightly shorter than the sepals, not at all carinate, prominently nerved, more or less lepidote when young, becoming glabrous with age: flowers subsessile; sepals lanceolate, 10–17 mm. long, free, glabrous; petals with narrow claw and large suborbicular spreading blue or violet blade; stamens deeply included, exceeding the pistil: capsule cylindric, ca. 2 cm. long.—Presl, Rel. Haenke. i. 125 (1827); R. & S. Syst. vii. 1203 (1830); Gay, Fl. Chil. vi. 16 (1853); Phil. An. Univ. Chile, lix. 323 (1881), Cat. Pl. Chil. 279 (1881); Bak. Journ. Bot. xxv. 279 (1887); Brom. 166 (1889); Mez in DC. Mon. Phan. ix. 884 (1896); L. B. Smith, Contrib. Gray Herb. civ. 81, t. 2 (1934). *T. fusca* Bak. in Journ. Bot. xvi. 240 (1878); xxv. 213 (1887); Brom. 161 (1889); Mez in DC. Mon. Phan. ix. 727 (1896). *T. scalarifolia* Bak. in Journ. Bot. xxv. 235 (1887); Brom. 165 (1889); Mez in DC. Mon. Phan. ix. 857 (1896); Mez ex Bruns in Mitt. Inst. Allg. Bot. Hamburg, viii. 41 (1929); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 120 (1930); F. L. Herrera, Est. Fl. Dep. Cuzco, 78 (1930). *T. Schenckiana* Wittm. in Engl. Bot. Jahrb. xi. 63 (1889); Bak. Brom. 165 (1889). *T. chilensis* Bak. Brom. 166 (1889); Mez in DC. Mon. Phan. ix. 857 (1896). *T. lanata* Mez in Bull. Herb. Boiss. ser. 2, v. 109 (1905); Weberbauer, peruan. Anden in Engl. & Drude, Veg. d. Erde, xii. 81 (1911). *T. favillosa* Mez in Fedde, Rep. Spec. Nov. iii. 43 (1906); Weberbauer, peruan. Anden in Engl. & Drude, Veg. d. Erde, xii. 81 (1911); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 120 (1930).

COLOMBIA: Cauca or Tolima (?): near La Plata, alt. 1000 m., 1882, *Lehmann XXVII* (Bo, type of *T. Schenckiana;* BM, phot. G); same, *2234* (Mez!). PERU: San Martin: near Moyobamba, *Steubel 62 b* (Mez!); Lima: Obrajillo, *Brackenridge in Wilkes Expedition* (K, type of *T. fusca;* G, US); near Matucana, alt. 2370 m., *Weberbauer 1697* (B, type of *T. lanata;* phot. G); Chosica, alt. 1000 m., 1923, *Macbride 2879* (G, US, FM); Cuzco: prov. Urubamba, near Ollantaitambo, alt. 2800–3000 m., 1905, *Weberbauer 4933* (B, type of *T. favillosa;* phot. G); 1915, *Cook & Gilbert 554* (US); 1925, *F. L. Herrera 702; 801* (US); Torontoy, Urubamba Valley, alt. 2400 m., 1915, *Cook & Gilbert 1774* (US); Arequipa: Cachendo, alt. ca. 1000 m., *Guenther & Buchtien 357* (Mez!). BOLIVIA: La Paz: La Granja, alt. 2600 m., 1923, *Bro. Julio 158* (US, BM); Indefinite: *Pentland* (K, type of *T. scalarifolia;* phot. G). CHILE: without further locality, *Haenke* (Prague, type; phot. G); northern Andes of Chile (Baker!), *Gay* (P, type of *T. chilensis;* phot. G).

In spite of the addition of *T. chilensis* to the synonymy of *T. paleacea* it is still extremely doubtful whether the species occurs in Chile. Gay said of *T. paleacea:* "Dudamos tambien que Haenke haya encontrado esta planta en Chile; á nuestro modo de ver, este país no incluye ninguna especie de Tillandsia con flores en espiga."

In view of this statement and of the fact that the label on the type of *T. chilensis* is merely a form-label with "Chili" printed on it and no further data written in, it seems likely that Gay really collected the plant during his stay at either Lima or Cuzco.

19. **Tillandsia** (§ **Phytarrhiza**) **arhiza** Mez. Roots wholly lacking (Balansa!): stem up to 6 dm. long, stout: leaves densely polystichous, ca. 2 dm. long, ferruginous-cinereous, densely and coarsely pruinose- or tomentose-lepidote; sheaths elongate, broadly elliptic, amplexicaul, ochreiform, glabrous inside and below the middle outside; blades very narrowly triangular, 7–9 mm. wide, channeled, involute-subulate above the middle, filiform-acuminate, erect or diverging, recurving toward apex: scape slender, erect, exceeding the leaves, glabrous; its bracts erect, tubular-involute, equalling or exceeding the internodes, sublanceolate, acute or apiculate, densely lepidote: inflorescence depauperate-compound in the type with two much reduced lateral spikes but more often simple and distichous; axes glabrous; primary bracts like the scape-bracts, lepidote, much shorter than the axillary spikes; single or principal spike linear or lanceolate in outline, up to 75 mm. long, 10 mm. wide, densely 6–12-flowered; rhachis strongly angled, slightly flexuous; floral bracts strictly erect, often closely involute about the sepals, not noticeably imbricate, narrowly elliptic, apiculate, ca. 15 mm. long, from distinctly shorter than to slightly exceeding the sepals even on the same plant, chartaceous, glabrous or the lowest scantly lepidote, prominently nerved: flowers with a very short stout pedicel; sepals elliptic, acute or obtuse, ca. 12 mm. long, 5 mm. wide, even, glabrous, coriaceous, subequally connate up to about 3 mm.; petals violet, ca. 23 mm. long, blades suborbicular, stamens deeply included, exceeding the pistil, anthers linear, acute; ovary elongate, prismatic, abruptly contracted into the style: capsule cylindric, abruptly acute.—Saxicolous; Paraguay.—Mez in DC. Mon. Phan. ix. 855 (1896); Chod. & Vischer, Vég. Par. in Bull. Soc. Bot. Genève, ser. 2, viii. 202–64, t. 98–100, 104 (1916); Hassler in Ann. Cons. & Jard. Bot. Genève, xx. 330 (1919); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 120 (1930). *T. rupestris* Mez in DC. Mon. Phan. ix. 856 (1896); Plant. Hassl. ii. 259 in Bull. Herb. Boiss. ser. 2, iii. 1037 (1903); Chod. &

Vischer, Vég. Par. in Bull. Soc. Bot. Genève, ser. 2, viii. 202–64, t. 87–9, 91 (1916). *T. rupestris* var. *pendens* Chod. & Vischer, ibid. 229, t. 91–2 (1916). *T. arhiza* var. *rupestris* Hassler in Ann. Cons. & Jard. Bot. Genève, xx. 331 (1919); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 120 (1930).—Pl. III, figs. 2–3.

PARAGUAY: on granite rocks at the summit of Cerro d'Acahy, near Paranaguari, *Balansa 4747* (P, TYPE; phot. G); on granite rocks of Cerro San Thomas near Paranaguari, *Balansa 4746* (Bo, P, type of *T. rupestris;* phot. G); slopes of San Thomas, *Hassler 1000* (K, phot. G).

20. **Tillandsia** (§ **Phytarrhiza**) **caerulea** HBK. Plants up to 25 cm. long, sometimes in dense masses: roots lacking: stem simple, 4–6 cm. long: leaves polystichous, 10–15 cm. long, densely furfuraceous or tomentose-lepidote, cinereous; sheaths ovate, barely over 1 cm. long; blades mostly spreading or reflexed, filiform-subulate, involute, soft, more or less flexuous or contorted, ca. 2 mm. broad at base: scape terminal, erect, up to 15 cm. long, ca. 1 mm. in diameter at base, lepidote; its bracts involute, erect, shorter than the internodes at least as regards the sheathing portion, densely lepidote, filiform-laminate: inflorescence always simple and distichous, 4–7 cm. long, laxly 3–7-flowered with the apical one sterile; rhachis very slender, subterete, lepidote, strongly offset opposite the base of each flower but otherwise only slightly flexuous; floral bracts closely enfolding the calyx, not at all imbricate nor concealing the rhachis, diverging from the rhachis at an angle of about 45°, slightly longer than the internodes, elliptic, acute, ca. 15 mm. long, 7 mm. broad, equalling or exceeding the sepals, chartaceous, prominently nerved, lepidote, sometimes dark purple: flowers sessile; sepals lanceolate, acute, mucronate, prominently nerved, equally short-connate, 12 mm. long, 4 mm. wide, glabrous, thin; petals 20 mm. long, claw narrow, blade subrhombic, 7 mm. wide, blue; stamens ca. 8 mm. long, deeply included, exceeding the pistil, anthers 3 mm. long, linear, dorsifixed near base; ovary stout, subprismatic, about the same length as and but little thicker than the style.—Epiphytic; Ecuador, Peru.—Nov. Gen. i. 291 (1816); R. &. S. Syst. vii. 1209 (1830); Bak. Journ. Bot. xxv. 305 (1887); Brom. 166 (1889); Mez in DC. Mon. Phan. ix. 861 (1896). *T. squamulosa* Willd. ex R. & S. Syst. vii. 1209 (1830), in synon. *Diaphoranthema squamulosa* Beer, Brom. 266 (1857).—Pl. IV, figs. 3–4.

ECUADOR: AZUAY: between Oña and Cuenca, alt. 2700–3300 m., 1923, *Hitchcock 21585* (US); LOJA: between El Tambo and La Toma, alt. 1000–2200 m., 1923, *Hitchcock 21334* (G, US). PERU: PIURA: Rio Macará, *Humboldt & Bonpland 3442* (B, P, TYPE; phot. G); Sancicito, about 40 miles north of

Sallana, Negritos, *O. Haught F-11* (FM); Amotape Mts., 1926, *O. Haught 128* (US).

What the Mexican citations of Sochipala and Sopilote in the original description of this species stand for I have been unable to ascertain. They can scarcely represent the same species.

The petal-blade of *T. caerulea* is much more like that of typical section *Phytarrhiza* than it is like that of *Diaphoranthema*, and accordingly I have transferred the species to *Phytarrhiza*.

21. **Tillandsia** (§ **Phytarrhiza**) **crocata** (E. Morr.) Bak. Plant 15–35 cm. long: roots present: stem simple or few-branched, up to 2 dm. and more long (Mez!): leaves distichous, 1–3 dm. long, densely tomentose-lepidote with fine reflexed scales; sheaths broadly ovate, glabrous except for the upper half outside; blades spreading or recurving, linear, long-acuminate, involute-subulate, 2–5 mm. in diameter at base: scape terminal, erect or nearly so, slender, 5–15 cm. long, retrorse-tomentose like the leaves, naked or with a single leaf-like bract: inflorescence always simple and distichous, lanceolate or elliptic, acute, 1–4 cm. long not counting the petals or capsules, densely 2–6-flowered with the terminal flower sometimes sterile; floral bracts imbricate, 2–5 times as long as the internodes, ovate, acuminate, up to 2 cm. long, about equalling the sepals, densely tomentose-lepidote: flowers very short-pedicellate, fragrant (Lindman!); sepals sublanceolate, broadly acute or obtuse, thin, prominently nerved, densely appressed-lepidote except in extreme age; petals up to 2 cm. long; blade suborbicular, obtuse, 6–8 mm. broad, bright yellow; stamens deeply included, exceeding the pistil: capsule cylindric, ca. 3 cm. long.—Terrestrial and epiphytic; Bolivia, Brazil, Uruguay, Argentina.—Bak. in Journ. Bot. xxv. 214 (1887); Brom. 163 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 607 (1894); Mez in DC. Mon. Phan. ix. 860 (1896); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 120 (1930); L. B. Smith in Ostenia, 361 (1933). *Phytarrhiza crocata* E. Morr. in Belg. Hort. xxx. 87 (1880). *T. Mandonii* E. Morr. ex Mez in DC. Mon. Phan. ix. 871 (1896); Ann. Cons. & Jard. Bot. Genève, xx. 334 (1919).—Pl. IV, figs. 21–22.

BOLIVIA: La Paz: prov. Larecaja, between S. Pedro and Coaconi, alt. 2650 m., 1861, *Mandon 1180* (K, type of *T. Mandonii;* BM, G, S). BRAZIL: Paraná: Capão Grande, Villa Velha, alt. 875 m., 1904, *Dusén 4284* (S, MN Rio); Villa Velha, 1910, *Dusén 9238* (S, G, US); Rio Grande do Sul: on little island in the mouth of the Rio Jacuhy, *Tweedie 427* (K, phot. G); Porto Alegre, Morro de Santa Theresa, 1893, *Golland in hb. Lindman* (S); Indefinite: 1879, *Lietze* (type; represented by one of the Morren Icones in hb. Kew, not known whether specimen still exists). URUGUAY: Mercedes: Rincon del Cololo, 1893, *Osten 3055* (Ost); Indefinite: *Miers 1367* (BM). ARGENTINA: Entre Rios: Concepcion del Uruguay, 1882, *Hieronymus* (S).

*Tillandsia Mandonii* was based on very old and weathered material. The only character in its description to distinguish it from *T. crocata* is the supposedly glabrous sepals, but both the Mandon and Miers collections show some scales still left on the sepals.

22. **Tillandsia** (§ **Phytarrhiza**) **bandensis** Bak. Plant 1–2 dm. long: roots present: stem much branched with the branching largely in a single plane, 4–6 cm. long: leaves densely distichous, 5–7 cm. long, densely pruinose- or tomentose-lepidote, cinereous to fuscous; sheaths broadly ovate, ca. 1 cm. long, glabrous except for the upper half outside; blades suberect to spreading, linear-subulate, involute, long-acuminate, 1–2 mm. in diameter at base: scape terminal, erect or decurved, up to 9 cm. long, ca. 0.5 mm. in diameter, sulcate, lepidote at least below; its bracts 1–2, remote, much shorter than the internodes, elliptic, the upper acute or apiculate and usually glabrous, the lower usually filiform-laminate and appressed-lepidote: inflorescence always simple and distichous, linear-lanceolate, 2–3 cm. long and 3–5 mm. wide not counting the petals, 2–4-flowered; rhachis very slender, slightly flexuous, excavated next the flowers, glabrous; floral bracts remote, not at all imbricate, equaling or slightly longer than the internodes, ovate-elliptic, acute, membranaceous, more or less prominently nerved, 9–12 mm. long, the lower ones equaling or somewhat shorter than the sepals and sometimes scantly lepidote, the upper ones much shorter than the sepals and glabrous: flowers strictly erect and appressed to the rhachis; pedicel very short, obconic; sepals subelliptic, acute, 8–10 mm. long, 2.5–3 mm. broad, thin, prominently nerved, glabrous, equally subfree; petals 15–16 mm. long, claw narrow, blade distinct, broadly elliptic or obovate, 5 mm. long, 6 mm. broad, blue or violet; stamens deeply included, exceeding the pistil, anthers linear; ovary subprismatic, passing gradually into the short style: capsule cylindric, ca. 2 cm. long.—Epiphytic; Bolivia, Paraguay, Uruguay, Argentina.—Bak. in Journ. Bot. xxv. 234 (1887); Brom. 165 (1889); Kerr, Bot. Pilcom. in Trans. & Proc. Edinb. Bot. Soc. xx. 73 (1894); Mez in DC. Mon. Phan. ix. 858 (1896); Hassler, Flor. Pilcom. in Trab. Mus. Farmac. B. A. xxi. 42 (1909); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 242 (1917); Herter, Florula Urug. 45 (1930); L. B. Smith, Not. Brom. in Ostenia, 362 (1933); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 498 (1933). *T. quadriflora* Bak. Brom. 163 (1889), as to *Miers 1363*. *T. recurvata* var. *majuscula* Mez in Mart. Fl. Bras. iii. pt. 3, 611 (1894). *T. bandensis* var. *intermedia* Hassler in Ann. Cons. & Jard. Bot. Genève, xx. 333 (1919); Castellanos, Brom. & Cact. in Physis, x. 86, t. 2 (1930).

BOLIVIA: Santa Cruz: Cerro de Alto Mairana, alt. 2000 m., 1921, *Steinbach 6039* (FM). PARAGUAY: Gran Chaco, Santa Elisa, 23° 10′ S. lat., 1903, *Hassler 2778* (Bo, type of var. *intermedia;* G, BM). URUGUAY: Salto: 1924, *Schroeder* (Ost 17768 b, G); San José: near San José, *Arechavaleta 2612* (Mez!); Colonia: Carmelo, 1922, *Schroeder* (Ost 16442, G); Indefinite: *Tweedie* (K, type; phot. G); *Miers 1363* (BM). ARGENTINA: Formosa: Rio Pilcomayo, *Kerr 109* (K, phot. G); Formosa, *Jörgensen 2010* (G, US, Mo); *Jörgensen s. n.* (Ost 13780); *Jörgensen 1129* (Castellanos!); Chaco: Resistencia, 1924, *Castellanos 24/1246* (Castellanos!); Jujuy: Quinta, near Laguna de la Brea, 1901, *Fries 417* (S); Rio Chijra, 1924, *Schreiter 2605* (Castellanos!); Salta: Gran Chaco Salteño, Ipaguazo, 1902, *Calcagnini* (Castellanos!); Rio Juramento, 1922, *Castellanos* (Castellanos!); Orán, 1931, *Ragonese* (Castellanos!); Tucumán: dept. Trancas, Vipos, alt. 786 m., 1923, *Schreiter 1265* (Ost, G); Vipos, 1922, *Schreiter 27/2340* (Castellanos!); near Tucumán, 1926, *Schreiter 26/2375*; 1927, *27/2879* (Castellanos!); El Duraznito, near Tucumán, alt. 600 m., 1924, *Venturi 2801* (Ost, S, BA); dept. Trancas, Tapia, alt. 750 m., 1920, *Venturi 1119* (FM, S, Ost, BA); Chañar Pozo, 1919, *Venturi 1127* (Castellanos!); Catamarca: Quebrada de Totoral, Concepción, 1909, *Castillon 6601* (Castellanos!); El Valle, 1886, *Spegazzini 159* (Castellanos!); dept. El Alto, 1928, *Balcosna in hb. Venturi 7184* (Castellanos!); Santiago del Estero: La Parilla, near Gancedo, 1924, *Castellanos 24/1318* (G, BA); Sotelo, 1915, *De Carles 1130* (Castellanos!); La Rioja: General Roca, San Francisco, 1928, *Gomez 28/744* (Castellanos!); Córdoba: dept. San Javier, Yacanto, 1921, *Molfino* (Castellanos!); Santa Fe: Malabrigo, F. C. a Reconquista, 1906, *Schroeder* (Castellanos!); Entre Rios: Concordia, Duraznal, 1931, *Castellanos 31/978* (Castellanos!); Buenos Aires: Delta del Paraná, isla Forges, 1902, *Hicken 101* (Castellanos!); Delta del Paraná, Rio Barca Grande, 1931, *Cabrera 1634* (G, SP); Delta del Paraná, 1916, *Hauman 28/1131* (Castellanos!); San Isidro, 1906, *Hauman 1128* (Castellanos!).

Mez's citations of *T. bandensis* are so badly mixed geographically that it is not possible to use them without further checking, although I have little doubt of their taxonomic accuracy. The main trouble is his interpretation of the old term, "*Banda Oriental,*" as Paraguay, when it should be Uruguay. In addition I can find no basis for his considering that the Tweedie material came from Brazil.

As already pointed out in Ostenia, Hassler's var. *intermedia* differs from Mez's description of the type of *T. bandensis* but not from the type.

23. **Tillandsia** (§ **Phytarrhiza**) **Mallemontii** Glaziou. Plant up to 25 cm. long: roots present: stem very slender, 1–2 dm. long, branching: leaves distichous, up to 12 cm. long, cinereous, densely pruinose-lepidote; sheaths narrowly ovate, up to 2 cm. long, membranaceous, glabrous within and below on the outside; blades mostly spreading or reflexed, irregularly curved, linear, long-acuminate, 1–1.5 mm. in diameter: scape terminal, erect to strongly curved, up to 13 cm. long, lepidote, almost filiform; scape-bracts like the floral bracts but sometimes long-laminate, 1 or 2 immediately below the inflorescence or rarely one somewhat remote: inflorescence always simple and distichous, narrowly lanceolate, complanate, 25 mm. long

and 4 mm. wide not counting the petals, densely 1–4-flowered; rhachis glabrous, compressed, slightly geniculate; floral bracts slightly more than twice as long as the internodes but not really imbricate because separated by the flowers at anthesis, ovate, acute, up to 9 mm. long, ecarinate, prominently nerved, thin, densely lepidote: flowers strictly erect, subsessile; sepals suboblong, acute, 12.5 mm. long, glabrous, nerved, equally short-connate; petals up to 17 mm. long, claw linear, blade suborbicular, obtuse, 6.5 mm. broad, spreading at anthesis, blue or violet; stamens deeply included, exceeding the pistil, anthers oblong, obtuse, 2 mm. long; ovary cylindric, abruptly contracted into the short thick style.—Terrestrial and epiphytic; Brazil.—Glaziou ex Mez in Mart. Fl. Bras. iii. pt. 3, 608, t. 114, fig. 1 (1894); Mez in DC. Mon. Phan. ix. 859 (1896); Silveira, Narrativas e Memorias, i. 277 (1924); Flor. Montium, ii. 6, t. 8 (1931). *T. linearis* Vell. sensu Bak. Journ. Bot. xxv. 234 (1887); Brom. 164 (1889), non Vell. (1825). *Phytarhiza uniflora* E. Morr. ex Bak. Brom. 164 (1889), in synon.

BRAZIL: Rio de Janeiro: Alt. Macahé, near Nova Friburgo, 1891, *Glaziou 18563* (US, K, phot. G); Federal District: near Tijucá, *Glaziou 14345* (B, type; K); horto imperiali, São Christovão, Rio de Janeiro, 1892, *Lindman A 35* (S); same, 1897, *Ule 1313 in part* (MN Rio); São Paulo: *St.-Hilaire Cat. C², 1451* (P); Paraná: *Binot* (Mez!); Villa Velha, 1904, *Dusén 4107* (MN Rio); Jaguariahyva, alt. 740 m., 1910, *Dusén 10071* (S); Porto Amazonas, alt. 700 m., *Lange in hb. Dusén 9530* (S); Santa Catharina: near Tubarão, *Ule 1313 in part* (Mez!); Rio Grande do Sul: Cachoeira, on the road to Colonia S. Angelo, 1893, *Lindman A 1007* (S); Pelotas, 1923, *Parcus* (Ost 17082).

When the petals of *T. Mallemontii* are well expanded there is no danger of mistaking it for *T. recurvata*, but except for the petals there is no one character that holds. Within the range of *T. Mallemontii*, *T. recurvata* is usually much smaller. *T. Mallemontii* combines the characters of large size, long stem and all floral bracts shorter than the sepals. *T. recurvata* has the same characters but not all combined at once.

Mez gives *Phytarhiza uniflora* as a synonym of *Tillandsia recurvata*, presumably on the ground that *Tillandsia uniflora* was. However, there is no evidence that Morren intended *Phytarhiza uniflora* as a new combination and his plate in the Kew herbarium is unmistakably *T. Mallemontii*.

24. **Tillandsia** (§ **Diaphoranthema**) **loliacea** Mart. Plants up to 17 cm. long but usually much less: roots present: stem usually evident, simple or branched, rarely more than 4 cm. long: leaves densely polystichous, up to 4 cm. (Mez!) but usually 2–3 cm. long,

cinereous to fuscous, densely and coarsely pruinose-lepidote; sheaths ca. 3 mm. long, but slightly broader than the blade, glabrous, pale, subcoriaceous with broad hyaline margins, prominently nerved; blades erect to suberect or arching-secund, rigid, very narrowly triangular, long-acuminate but not filiform, 3–5 mm. wide at base: scape terminal, straight or curving, up to 10 cm. long, less than 1 mm. in diameter, lepidote; its bracts numerous, about equaling the internodes, elliptic, acute, chartaceous, prominently nerved, densely lepidote: inflorescence always simple and distichous, linear, up to 4 cm. long, very much like that of *Lolium* in its size and sinuous outline, up to 16-flowered (Hoehne!) but often with very few; rhachis strongly geniculate, flattened and excavated next the flowers, lepidote; floral bracts not at all imbricate, about one and a half times as long as the internodes, closely enfolding the flowers, ovate, acute, 8 mm. long, equaling or shorter than the sepals, thin, strongly nerved, densely lepidote: flowers erect and appressed to the rhachis, subsessile; sepals lanceolate, acute, up to 9 mm. long, glabrous, prominently nerved, equally short-connate; petals 10 mm. long, pale violet (Mez!) to yellow, claw sublinear, blade narrow, acute; stamens deeply included, exceeding the pistil, anthers 1.25 mm. long; ovary short-cylindric, abruptly contracted into the thick style; ovules long-caudate: capsule slenderly cylindric, short-beaked, up to 45 mm. long (Mez!).—Terrestrial and epiphytic; Brazil, Peru, Bolivia, Paraguay, Uruguay, Argentina.—Mart. ex R. & S. Syst. vii. 1204 (1830); Bak. Journ. Bot. xxv. 344 (1887); Brom. 189 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 611, t. 114, fig. 2 (1894); Mez in DC. Mon. Phan. ix. 862 (1896); O. Ktze. Rev. Gen. iii. 304 (1898); Mez, Plant. Hassl. ii. 259 in Bull. Herb. Boiss. ser. 2, iii. 1037 (1903); Chod. & Vischer, Vég. Par. in Bull. Soc. Bot. Genève, ser. 2, viii. 202–64, t. 76, 81–5 (1916); Hassler in Ann. Cons. & Jard. Bot. Genève, xx. 333 (1919); Hoehne in Comm. Linh. Telegr. Estrat. Matto-Grosso (Publ. 47), Annexo, v. Bot. pt. 9, 14, t. 164 (1919); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 504 (1933). *T. undulata* Bak. in Journ. Bot. xvi. 240 (1878); xxv. 213 (1887); Brom. 162 (1889). *T. quadriflora* Bak. Brom. 163 (1889), in part. *T. atrichoides* S. Moore in Trans. Linn. Soc. ser. 2, iv. 491 (1895).

BRAZIL: Ceará: Cariri, 1910, *Löfgren 496* (S, MN Rio); Bahia: Monte Santo, near Joazeiro, *Martius* (Mun, type; phot. G); Minas Geraes: *Glaziou 13241* (P); Conselheiro Matta-Rodeador, 1934, *Brade 13498* (JB Rio, G); São Paulo: Descalvado, 1932, *A. Gehrt in hb. S. P. 29795* (G, SP); Matto Grosso: between Corumbá and Ladário, 1892, *S. Moore 1046* (BM, type of *T. atrichoides;* phot. G); Diamantino, 1894, *Lindman b* (S); Corumbá, 1902, *Robert in hb. Sladen 791* (BM); 1911, *Hoehne 3556-9* (MN Rio). PERU:

*Mathews* (Mez!). BOLIVIA: SANTA CRUZ: Velasco, alt. 200 m., 1892, *Kuntze* (NY); Oriente, Charagua, alt. 800 m., 1934, *Cardenas 2681* (G); INDEFINITE: *Mandon 1176; Weddell 4175* (Mez!). PARAGUAY: mouth of the Rio Spane, near Villa Concepcion, 1875, *Balansa 619* (K, type of *T. undulata;* phot. G); Asuncion, 1874, *Balansa 619 a* (S); northern Paraguay, 1892, *Kuntze* (NY); El Chaco, Banks of the Rio Pilcomayo, 1893, *Lindman a* (S); Asuncion, Itapitapunta, 1893, *Lindman A 1611 a* (S); Paraguarí, 1893, *Lindman A 1611 b* (S); Cordillera de Altos, *Hassler 3861* (Mez!); Cerro Hu, Paraguary, *Hassler 2609* (Mez!); near Concepcion, *Hassler 7434* (Mez!); central Paraguay, *Rojas 1309* (Hassler!); *Chodat & Vischer 102, 102 bis* (Hassler!); San Bernardino, Ypecarai, 1915, *Osten 8106* (G, Ost, S); 1916, *Osten 8920, 8922 b* (Ost). ARGENTINA: MISIONES: *Niederlein* (Mez!); FORMOSA: Guayculé, *Jörgensen 3396* (G, US, Mo, BA); Formosa, 1917, *Muello* (Castellanos!); CHACO: near Resistencia, *Niederlein* (Mez!); JUJUY: Quinta, near Laguna de la Brea, 1901, *Fries 207, 415* (S); Santa Clara, 1901, *Fries 497* (S); Moralitos, 1922, *Castellanos* (Castellanos!); SALTA: Gran Chaco Salteño, Ipaguazo, 1902, *Calcagnini* (Castellanos!); Tabacal, 1928, *Burkart 28/707* (Castellanos!); between Embarcación and Yacuiba, 1923, *Hauman 1568* (Castellanos!); CORRIENTES: near Riachuelo, *Niederlein* (Mez!); INDEFINITE: *Hieronymus* (Mez!).

25. **Tillandsia** (§ **Diaphoranthema**) **erecta** Gill. Plant up to 11 cm. long: roots present: stem 3–6 cm. long, simple or few-branched: leaves densely polystichous, up to 5 cm. long, cinereous, densely and coarsely pruinose-lepidote; sheaths broadly ovate, ca. 5 mm. long, glabrous within and at the extreme base outside; blades erect to spreading, very narrowly triangular, involute-subulate, rigid, prominently nerved, angled toward apex, ca. 4 mm. broad at base: scape terminal, up to 45 mm. long, slender, strongly sulcate, glabrous, naked or with a single elliptic glabrous bract ca. 15 mm. long: inflorescence of a single flower with the rhachis prolonged behind it; floral bract triangular-ovate, acute, 8–10 mm. long, equaling or shorter than the sepals, glabrous, prominently 7–10-nerved: flower subsessile; sepals elliptic-lanceolate, acute, 10 mm. long, glabrous or scantly lepidote, prominently nerved, equally short-connate; petals narrowly elliptic, yellow in the dried material, punctate; stamens deeply included, exceeding the pistil: capsule slenderly cylindric, ca. 2 cm. long, abruptly short-beaked.—Epiphytic; Argentina.—Gill. ex Bak. in Journ. Bot. xvi. 239 (1878); xxv. 213 (1887); Brom. 162 (1889); Mez in DC. Mon. Phan. ix. 866 (1896); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 244 (1917). *T. rigida* Gill. ex Bak. in Journ. Bot. xvi. 239 (1878), in synonymy; Mez in DC. Mon. Phan. ix. 884 (1896). "Var. *T. rigida*" Gill. ex Bak. Brom. 162 (1889).—Pl. IV, fig. 2.

ARGENTINA: MENDOZA: foot of the cordillera, near Mendoza, without date, *Gillies* (K, TYPE; phot. G); same, 1822, *Gillies* (K, type of *T. rigida;* phot. G); INDEFINITE: *Castellanos* (G, BA).

26. **Tillandsia** (§ **Diaphoranthema**) **funebris** Castellanos.

Plant small, rarely over 10 cm. long including the inflorescence: stems several from a single point, densely massed, simple or few-branched, 2–5 cm. long: roots present: leaves densely distichous or polystichous, up to 5 cm. long; sheaths distinct, suborbicular to reniform, densely imbricate, making the stem appear stout, 5–8 mm. long, glabrous below, subcoriaceous, many-nerved with broad nerveless membranaceous margins; blades divergent to reflexed, more or less contorted, triangular-subulate, 2–3 mm. thick, strongly angled but not at all sulcate-striate, often distinctly keeled below, convolute above, acuminate, densely cinereous-lepidote with small nearly symmetrical subappressed to reflexed-pruinose scales: scape distinct, always terminal apparently, slender, erect, up to 5 cm. long, glabrous, strongly angled, naked for most of its length; scape-bracts oblong-lanceolate, acute, up to 17 mm. long but usually about 13 mm., subcoriaceous, many-nerved, even, 2 in number, usually a somewhat lepidote one near the base of the scape and a glabrous one just below the inflorescence: inflorescence 1–2-flowered, glabrous; floral bracts like the upper scape-bract but more ovate and progressively smaller, from slightly shorter to slightly longer than the sepals, even; rhachis like the scape and nearly as thick, swollen at the nodes: flowers subsessile, erect; sepals lanceolate, acute, even, many-nerved, 10 mm. long, equally connate for about 2 mm.; petals 13 mm. long, dark orange-brown when dry, coffee-colored when fresh (Venturi!), blade distinct, subrhombic, obtuse, spreading and often circinnate at anthesis; stamens deeply included, anthers basifixed, linear, acutish, less than 2 mm. long, filaments slightly shorter than the pistil; ovary ellipsoid, obtusely angled, contracted into the short thick style, stigma broadly capitate: capsule slenderly cylindric, 2 cm. long: seeds few.—Epiphytic; southeastern Bolivia and northwestern Argentina.—Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 502 (1933).

BOLIVIA: Santa Cruz: Oriente, Charagua to Izozog, alt. 800 m., 1934, *Cardenas 2688* (G). ARGENTINA: Salta: La Candelaria, Unquillo, 1931, *Schreiter 6619* (Castellanos!); Tucuman: dept. Trancas, Vipos, alt. 786–850 m., 1922, *Venturi 1873* (G, US, S); *Schreiter 1689* (BA 27/2362, type; G); 1923, *Schreiter 160 r* (Osten 17377).

This species is probably a close relative of *T. aizoides*, having the same trait of an isolated scape-bract just below the inflorescence, but its larger and spreading leaves distinguish it at first glance. In habit, *T. funebris* closely resembles *T. erecta*.

Castellanos records larger measurements for parts of the inflorescence than I have been able to find.

*T. funebris* is one of the species which appear transitional between *Phytarrhiza* and *Diaphoranthema*.

27. **Tillandsia** (§ **Diaphoranthema**) **tricholepis** Bak. Plant moss-like: roots present: stems many from a single point, densely massed, at first bearing flowers when short and simple but later elongate and much branched, up to 22 cm. long including the longest branch, but usually much less: leaves densely polystichous, up to 15 mm. long but averaging about 10 mm.; sheaths distinct, broadly ovate, glabrous and covered by the one below except at the extreme apex, membranaceous, scarious with 4 to 5 central nerves and broad nerveless margins; blades appressed to somewhat divergent, narrowly triangular, subulate-acuminate, involute, densely ferruginous- or cinereous-furfuraceous with lacerate asymmetric scales produced below into a spreading lobe so that under a lens the leaves appear reflexed-tomentose: scapes at first terminal, soon becoming pseudo-axillary by the elongation of the stem, slender, straight or somewhat flexuous, 1–4 cm. long, 0.3–0.5 mm. thick, sulcate, soon glabrous; scape-bracts several, evenly distributed, nearly or quite as long as the internodes, closely enfolding and concealing most of the scape, lanceolate, acute, membranaceous, sulcate, lepidote, 5–8 mm. long: inflorescence always of a single spike, 1–5-flowered, sometimes with a sterile floret at apex, narrowly lanceolate, up to 17 mm. long; rhachis slender, nearly straight, strongly angled, glabrous; floral bracts like the scape-bracts but broadly ovate, enfolding the rhachis for about half their length, slightly but consistently shorter than the sepals: flowers erect, subsessile but appearing stipitate because of the narrowing of the calyx-tube, up to 9 mm. long; sepals lanceolate, acute, equally connate at base for 1.5 mm., 6.5 mm. long, glabrous or with a very few scales, membranaceous, strongly nerved; petals pale yellow, punctate, linear, blade indistinct, obtuse, spreading at anthesis; stamens deeply included, less than half as long as the petals, exceeding the style, anthers linear, acutish, basifixed; ovary prismatic with a projecting ring just below the apex, style short but slender, stigmas just reaching the base of the anthers: capsule narrowly cylindric, abruptly contracted into a short beak, up to 2 cm. long, valves separating nearly to the base, remaining straight; seed narrowly fusiform, brown, up to 3 mm. long, with a short white beak at apex and at base a white coma up to 14 mm. long.—Epiphytic; eastern Brazil, Bolivia, Paraguay, and northern Argentina.—Bak. in Journ. Bot. xvi. 237 (1878); xxv. 213 (1887); Brom. 160 (1889); O. Ktze. Rev. Gen. iii. 304 (1898); Hassler in Ann. Cons. & Jard. Bot. Genève, xx. 334 (1919);

Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 507 (1933). *T. tricholepis* var. *argentea* Hassler in Ann. Cons. & Jard. Bot. Genève, xx. 334 (1919). *T. bryoides* Griseb. (in part) Symb. Arg. in Goett. Abh. xxiv. 334 (1879); Bak. Brom. 160 (1889); Morong & Britton, Enum. Pl. Parag. in Contrib. Herb. Columbia Coll. xxxv. in Ann. N. Y. Acad. Sci. vii. 236 (1892). *T. polytrichoides* E. Morr. in Belg. Hort. xxx. 240 (1880); Mez in Mart. Fl. Bras. iii. pt. 3, 612, t. 114, fig. 3 (1894); Mez in DC. Mon. Phan. ix. 863 (1896); Mez, Pl. Hassl. ii. 259, in Bull. Herb. Boiss. ser. 2, iii. 1037 (1903); Hassler, Fl. Pilcom. in Trab. Mus. Farmac. B. A. xxi. 41 (1909); Chod. & Vischer, Vég. Par. in Bull. Soc. Bot. Genève, ser. 2, viii. 210, 221, 232, 234, 260, t. 93–5 (1916); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 246 (1917); Herzog in Engl. & Drude, Veg. d. Erde, xv. 96–7 (1923); Lillo in Bol. Univ. Nac. Tucumán, i. no. 6, 5 (1925); Silveira, Narrativas e Memorias, i. 282 (1924); Flor. Montium, ii. 4, 5, 12, 13, t. 3 (1931); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930).

BRAZIL: Ceará: *F. Allemão CLXXI* (MN Rio); *Allemão & Cysneiros 1525; 1526 in part* (MN Rio); Minas Geraes: Conselheiro Matta-Rodeador, 1934, *Brade 13497* (JB Rio, G); Rio de Janeiro: on ironwork over Rio Parahyba, Barra do Pirahy, *Silveira* (Silveira!); Federal District: São Christovão, Rio de Janeiro, *Glaziou 3124; Schwacke 5458* (Mez!); 1892, *Lindman A 37* (S); 1929, *Brade 2168* (G); Indefinite: *Glaziou 66* (type of *T. polytrichoides*). BOLIVIA: El Beni: Trinidad, alt. 250 m., 1926, *Werdermann 2396* (S); La Paz: Poquerani, San Pedro, near Sorata, alt. 2500–2650 m., 1859, *Mandon 1179 in part* (K, type; BM, S, G, NY); Apolo, 1902, *R. S. Williams 1486* (NY, US, BM); prov. Inquisivi, Cañamina, alt. 1700 m., 1921, *O. E. White 272* (NY); Santa Cruz: Santa Cruz de la Sierra, alt. 1600 m., 1892, *O. Kuntze* (NY); "monte," Camatindi near Cumbarute and Woyuywe, Rio Parapiti, ca. 20° 25′ S. lat., 1910, *Herzog 1195* (S); Chaco, Agua Caliente near Charagua, alt. 800 m., 1934, *Cardenas 2611* (G, FM); Indefinite: 1861–3, *Pearce* (BM); *Weddell 3655* (P). PARAGUAY: Asuncion, 1874, *Balansa 617* (S, G, US); central Paraguay, between Villa Rica and Escoba, 1888–90, *Morong 492* (NY, G, US, Mo, BM); central Paraguay, *Balansa 617 a; Hassler 2610; Chodat & Vischer 93; 103* (Hassler!); upper Rio Apa, *Hassler 8517* (Hassler!, type of var. *argentea*); Pilcomayo River, Gran Chaco, *Morong 1086* (NY, BM); *Rojas 686* (Hassler!, as var. *argentea*); Cerros de Acahy, 1919, *Hassler 152* (Ost); northern Paraguay, 1892, *O. Kuntze* (NY); Asuncion, Itapitapunta, 1893, *Lindman 1611* (S); Colonia Elisa near San Antonio, 1893, *Lindman A 1781* (S, G); El Chaco, Paso Manduvi, Rio Pilcomayo, 1893, *Lindman A 1897 1/2* (S, G); El Chaco, Obraje Gill, Rio Pilcomayo, 1893, *Lindman A 1905 1/2* (S, G); Cerro de Acahy, 1919, *Rojas 152* (Ost); Ypacarai, San Bernardino, 1915, *Osten 8105* (Ost); indefinite, *Weddell 3222* (P). ARGENTINA: Formosa: Formosa, 1917, *Jörgensen* (S); 1919, *2800* (G, Mo); near Laishi, 1918, with *Jörgensen 2576* (Ost); Jujuy: Quinta near Laguna de la Brea, 1901, *Fries 416* (S); dept. Ledesma, Sierra de Calilagua, alt. 700 m., 1927, *Venturi 7291* (US); San Pedro, 1893, *Spegazzini 163* (Castellanos!); Salta: Salta, 1901, *Fries 14* (S); dept. Orán, Obra Grande, alt. 750 m., 1927, *Venturi 5620* (US); Orán, 1931, *Ragonese* (Castellanos!); Termas de Rosario de la Frontera, 1931, *Herborn* (Castellanos!); Orán, Pichanal, 1913, *Rodriguez 1119* (G, BA);

dept. Candelaria, Sierra de la Candelaria, alt. 1100 m., 1924, *Venturi 4080* (US); Tartagal, 1924, *Schreiter 3508* (Castellanos!); 1930, *Parodi 9232* (G); TUCUMAN: La Cruz, 1872, *Lorentz & Hieronymus 60* (NY); Tafi viejo, *Tatter in hb. Kurtz 4146* (Mez!); Lules, 1916, *Sanzin 1160* (Ost); Alpachiri, 1916, *Jörgensen* (Ost 11666); dept. Trancas, Vipos, alt. 850 m., 1922, *Venturi 1977* (G, US); dept. Capital, El Duraznito, alt. 600 m., 1924, *Venturi 2799* (G); indefinite, 1918, *Schreiter 800* (Ost, S); SAN JUAN: San Juan, 1931, *Correa* (Castellanos!); CÓRDOBA: 1877, *Hieronymus* (BM); Estancia Germania, near Córdoba, 1874, *Lorentz 128 in part* (BM, Mun); near Córdoba, 1876, *Hieronymus 482* (FM); Chacra de La Merced, 1881, *Hieronymus* (NY); SANTA FE: Colonia Margarita, 1905, *Wolfhügel* (Castellanos!).

The name of *T. tricholepis* for this species has clear priority over the others. Mez chose the later *T. polytrichoides*, so far as can be inferred without any explanatory note, because the type of *T. tricholepis* came from a mixed number. Yet Baker clearly distinguished *T. tricholepis* from *T. bryoides*, the other species under *Mandon 1179*, when he said: "Peduncle . . . 1–2-flowered, . . . with several . . . bracts." These few words eliminate *T. bryoides* completely, since it never has more than one flower and its peduncle or scape if present is always naked. Mez's distinction in the key to his monograph is really less complete when it divides between inflorescence 1-flowered and more than 1-flowered, because in *T. tricholepis* the inflorescence on the same plant may be both 1-flowered and up to 5-flowered as in *Morong 492* (G). The real point between the two is the presence or absence of scape-bracts.

Hassler's variety *argentea* does not appear tenable to me, since the color of the leaf-scales varies considerably on a single plant and appears to be largely a matter of age and treatment in collecting.

28. **Tillandsia** (§ **Diaphoranthema**) **bryoides** Griseb. emend. L. B. Smith. Plant small and with a habit like that of *Lycopodium Selago:* roots present: stems many from a single point, densely massed, simple or sparingly branched, rarely more than 5 cm. long including the longest branch: leaves densely polystichous, 4–9 mm. long but averaging about 6 mm.; sheaths distinct, broadly ovate or triangular to suborbicular, usually as long as the blade, glabrous below, membranaceous, scarious, with 3 central nerves which often touch and broad nerveless margins; blades erect, strict, making the stem appear terete, subtriangular, acute, concave above, convex below, becoming obtusely carinate toward base, up to 2 mm. broad, densely cinereous-lepidote, the scales varying from suborbicular to strongly asymmetric with an elliptic or triangular basal lobe, denticulate, spreading at base so that under a lens the leaves appear reflexed-tomentose: scape often lacking so that the inflorescence is sunk among the terminal leaves, when present evidently elongating only after anthesis, erect,

slender, glabrous, sulcate, naked or with a single lanceolate bract enfolding its extreme base, up to 3 cm. long: inflorescence usually terminal but sometimes becoming pseudoaxillary by the elongation of the stem, always composed of a single flower; floral bract up to 7 mm. long, triangular-ovate, hyaline with a single median excurrent nerve, glabrous or with a few scales toward apex: flower subsessile; sepals linear-elliptic, 5–9 mm. long, obtuse or acute, hyaline, 3-nerved, slightly exceeding the floral bract, equally short-connate for about 1 mm. at base; petals linear with little distinction between claw and blade, erect or nearly so at anthesis, not twisted, fleshy, orange-brown when dry, sulphur-yellow when fresh (Schreiter! Castellanos!); stamens deeply included, anthers linear, filaments about equaling the pistil; ovary subprismatic, stout, abruptly contracted into the short but slender style, stigma capitate: capsule slenderly cylindric, abruptly contracted into a short beak, up to 17 mm. long; seeds few.—Epiphytic and saxicolous; Peru, Bolivia, Argentina.—Griseb. ex Bak. in Journ. Bot. xvi. 236 (1878); xxv. 213 (1887); Griseb. Symb. Argent. in Goett. Abh. xxiv. 334 (1879); Lor. & Niederl. in Roca, Exped. Rio Negro, ii. 283 (1881); Wittm. in Engl. & Prantl, Nat. Pflanzenf. ii. Abt. 4, 56 (1888); Bak. Brom. 160 (1889); O. Ktze. Rev. Gen. iii. 303 (1898). *T. coarctata* Gillies ex Bak. in Journ. Bot. xvi. 236 (1878) in synonymy, not Willd. (1830); Ball (authority wrongly given as "W"), in Journ. Linn. Soc. xxi. 234 (1884); Mez in DC. Mon. Phan. ix. 865 (1896); Macloskie, Rep. Princeton Univ. Exped. Patagonia, viii. 293 (1904); Hicken, Notas Bot. 13 (1908); Hauman in An. Mus. Nac. Hist. Nat. B. A. xxiv. 376 (1913); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 243 (1917); Herzog in Engl. & Drude, Veg. d. Erde, xv. 97 (1923); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 499 (1933). *T. coarctata* var. *pedicellata* Mez in DC. Mon. Phan. ix. 865 (1896); Macloskie, Rep. Princeton Univ. Exped. Patagonia, viii. 294 (1904); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 499 (1933).—Pl. IV, figs. 5–7.

PERU: *Gay 1574* (P). BOLIVIA: La Paz: prov. Larecaja, near Sorata, alt. 2500–2650 m., 1858–9, *Mandon 1179 in part* (K, BM); indefinite, alt, over 4000 m., *Pentland 29* (P); Huancana, alt. 2800 m., 1906, *Buchtien 806* (US, NY); Cotaña, near Illimani, alt. 2450 m., 1911, *Buchtien 4144* (G); Potosi: Rio Blanco, 1932, *Cardenas 318* (US); Cochabamba: Parotani, alt. 2400 m., 1892, *Kuntze* (NY); Santa Cruz: "monte," Cumbarute and Woyuywe, Rio Parapiti, ca. 20° 25′ S. lat., 1910, *Herzog* (Herzog!); Oriente, Charagua to Izozog, alt. 800 m., 1934, *Cardenas 2690* (G); Chuquisaca: Camataqui, alt. 1800 m., 1932, *Cardenas 213* (G); Indefinite: *Miers 7592–7592x* (BM).

ARGENTINA: JUJUY: termas de Reyes, 1928, *Burkart 27/708* (Castellanos!); Volcán, 1927, *Castillon 6571* (Castellanos!); 1922, *Castellanos* (Castellanos!); SALTA: Metán, 1930, *Castellanos 30/3026* (Castellanos!); Cafayate, 1919, *Hauman 1133* (Castellanos!); indefinite, *Weber* (Mez!); TUCUMÁN: -dept. Trancas, Vipos, 1921, *Schreiter 27/2360* (G, BA); same, alt. 786 m., 1922, *Schreiter 2029* (Ost); same, alt. 850 m., 1922, *Venturi 1978* (G, US, Ost, BA); CATAMARCA: 1899, *Spegazzini 199* (Castellanos!); 1904, *Baldi* (Castellanos!); SANTIAGO DEL ESTERO: near Santiago, 1906, *Spegazzini 198* (Castellanos!); LA RIOJA: Sierra de Famatina, Guanchín, 1928, *Castellanos 28/106* (Castellanos!); CÓRDOBA: Sierra Achala, *Hieronymus 795 in part* (BM); Sierra Chica, "El Zapato," near Capilla del Monte, alt. ca. 1000 m., 1917, *Osten 10543* (Ost); 1918, *Osten 13469* (Ost, S); *13470* (Ost); Sierra Chica, Rio Pintos, alt. ca. 1000 m., 1918, *Osten 13495* (Ost, S); between Rio Pintos and Characate, *Osten 13494* (Ost); Sierra Chica, Los Paredones, near Capilla del Monte, alt. ca. 1000 m., 1918, *Osten 13468* (Ost); Valle de los Reartes, 1920, *Castellanos* (Ost 15281); 1925, *Castellanos 25/1748* (G, BA); Sierra Grande, 1920, *Castellanos* (Ost 15282); dept. San Javier, Yacanto, 1920, *Hauman 1135* (Castellanos!); Achala cuesta del Mogote, 1922, *Castellanos 1589* (Castellanos!); indefinite, *Lossen 189* (G, Mo); *Miers 1084* (BM); *Lorentz 128 in part* (TYPE); 1876, *Hieronymus 133* (US); SAN LUIS: Quebrada del Salado, 1882, *Galander* (US); Quines, quebrada del Zapallar, 1925, *Castellanos 25/619* (Castellanos!); Concarán, 1925, *Castellanos 25/2626* (Castellanos!); Cerro Varela, 1925, *Castellanos 25/2777* (Castellanos!); Santa Rosa del Gigante, 1926, *Castellanos 26/2047* (Castellanos!); Los Gigantes, 1926, *Castellanos 26/2044* (Castellanos!); San Francisco, quebrada de Ramos, 1925, *Castellanos 25/617* (Castellanos!); MENDOZA: foot of the Cordillera near Mendoza, 1825, *Gillies* (Cam, K, type of *T. coarctata;* phot. G); Potrerillos, alt. 1400 m., 1907, *Osten 5107* (Ost); Precord. San Ignacio, alt. 1300 m., 1915, *Sanzin 566* (Ost); Cacheuta, 1916, *Ruiz 116* (G, BA); San Rafael, Cañada Seca, 1921, *Ruiz 901* (G, BA); BUENOS AIRES: Rio Negro Inferior, 1912, *Hauman 1134* (Castellanos!); Sierra Ventana, 1881, *Lorentz 751* (Ost); *Lorentz* (US); *Hicken* (Castellanos!); LA PAMPA: Sierra Lihuel Calel, 1927, *Castellanos 27/266* (Castellanos!); CHUBUT: Camarones, 1912, *Aurelius 23* (S, phot. G); INDEFINITE: northern Argentina, *Hieronymus 351; 883; Hieronymus & Niederlein 852; Lorentz 351; Niederlein 26 in part* (Mez!); valley of the Rio Colorado, near Fuerte Pinzen, 1879, *Lorentz & Niederlein* (L. & N.! Mez!); valley of the Rio Negro, *Claraz 207* (Ball!); Sierras Pampeanas, 1881, *Lorentz 47* (NY).

*Tillandsia bryoides* was described from a mixed sheet and the original description unfortunately contained both elements. One element had already been described as *T. tricholepis*, so that the description is amended here to fit the previously undescribed second element. The only definite correction is that the spikes never have more than a single flower instead of: "Flowers 1–3." The name *T. coarctata* is invalid for this species by both the priority and homonym rules.

*Osten 5107* has both flowers and fruit, and the flowers are all sessile while the fruits are all elevated on a definite scape. This evidence would indicate that the scape elongates only after anthesis. If individuals were consistent in this process Mez's *T. coarctata* var. *pedicellata* would be a valid distinction, but capsules both with and without a scape may be found on the same plant as in *Aurelius 23*.

*Aurelius 23* is further noteworthy in that it establishes a new southern limit (ca. 45° S. lat.) for the entire *Bromeliaceae*.

29. **Tillandsia** (§ **Diaphoranthema**) **aizoides** Mez. Plant small and with a habit closely resembling that of *T. bryoides* but coarser and less compact: roots present: stems many from a single point, densely massed, simple or sparingly branched, up to 4 cm. long: leaves densely polystichous, usually about 10 mm. long, rarely up to 20 mm. (Mez!); sheaths distinct, broadly ovate, scarious, with 4–many nerves and broad nerveless margins; blades erect but somewhat divergent and not strict as in *T. bryoides*, sometimes slightly secund, angular-subulate, mucronate-acute, stout, 2 mm. thick, convex below, channeled above, densely cinereous-lepidote with reflexed-spreading scales: scape usually terminal, from very short to 2 cm. long, glabrous, angled, naked except for 1 or 2 bracts immediately below the flower or with a single bract midway; scape-bracts elliptic, acute, glabrous, often carinate (Mez!), sulcate with several strong nerves: inflorescence always composed of a single flower; floral bract elliptic, obtuse or apiculate, membranaceous, at least 3-nerved, shorter than the sepals: sepals elliptic, obtuse or acute, ca. 8 mm. long, glabrous, scarious, 5–7-nerved, connate anteriorly for 2 mm., posteriorly for 2.5 mm.; petals linear with little distinction between claw and blade, brownish when dry, probably yellow when fresh, but slightly exceeding the sepals; stamens deeply included, anthers linear; pistil not known: capsule slenderly cylindric, up to 2 cm. long, abruptly contracted into a short beak; seeds few.—Epiphytic and saxicolous; northwestern Argentina.—Mez in DC. Mon. Phan. ix. 866 (1896); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 242 (1917); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 498 (1933).—Pl. IV, figs. 8–9.

ARGENTINA: Tucumán: near Tucumán, 1926, *Schreiter 26/2374* (Castellanos!); La Rioja: valley of Famatina, 1879, *Hieronymus & Niederlein 850* (B, type; phot. G); Nonogasta, 1927, *Castellanos 27/1908* (Castellanos!); General Roca, San Francisco, 1928, *Gomez 28/743* (Castellanos!); Córdoba: Chacrarita de los Padres, Quebrada de la Tala, *Lorentz & Hieronymus* (Mez!); Sierra Chica, "El Zapato," near Capilla del Monte, alt. ca. 1000 m., 1918, *Osten 13471* (Ost); dept. San Javier, Yacanto, 1920, *Hauman 1123* (Castellanos!); near Villa Dolores, 1920, *Castellanos 1577* (Castellanos!); Achala, 1920, *Castellanos* (Castellanos!); indefinite, *Lossen 253* (G, FM, Mo); San Luis: San Francisco, quebrada de Ramo, 1925, *Castellanos 25/623* (Castellanos!); Luján, quebrada de las Higueras, 1925, *Castellanos 25/622* (Castellanos!); Cerro Varela, 1925, *Castellanos 25/2790* (Castellanos!); Nogolí, 1925, *Castellanos 25/630* (Castellanos!); Santa Rosa del Gigante, 1926, *Castellanos 26/2046* (Castellanos!).

As Mez has already pointed out this species is in many ways

intermediate between *T. bryoides* and *T. rectangula* and possibly may be a hybrid between the two. Certainly it appears to be much less frequent than either of its supposed parents and its range appears to be contained within theirs, but as yet there is no direct evidence to support the conclusion.

Mez cites the floral bract as being 7-nerved while I can find but 3. This may possibly be explained from the fact that the bract is so transparent that the nerves of the sepals underneath show through and from many angles of view appear to belong to the bract itself.

30. **Tillandsia** (§ **Diaphoranthema**) **angulosa** Mez. Plant pulvinate: stem less than 25 mm. long: roots present: leaves distichous or polystichous, up to 15 mm. long, densely and coarsely appressed-cinereous-lepidote; sheaths suborbicular, thin, many-nerved, glabrous only at extreme base; blades spreading to recurved, triangular, stout, angled, mucronate: scape very short and hidden by the leaves but bearing a single ovate acute prominently nerved densely lepidote bract: inflorescence always 1-flowered; floral bract like the scape-bract, slightly shorter than the sepals, at least 5-nerved: sepals elliptic, acute, 10 mm. long, prominently nerved, thin, often scantly lepidote, subfree: capsule slenderly subcylindric, abruptly short-beaked, 2 cm. long.—Epiphytic; northwestern Argentina.—Mez in DC. Mon. Phan. ix. 868 (1896); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 242 (1917).—Pl. IV, fig. 16.

ARGENTINA: La Rioja: Valle de Famatina, 1879, *Hieronymus & Niederlein 851* (B, TYPE; phot. G).

Mez considered that this species might be a hybrid of *T. retorta* and *T. bryoides*, and it seems very likely not only because of the way it combines the characters of the two but also in its lack of constancy in such traits as the arrangement of the leaves.

31. **Tillandsia** (§ **Diaphoranthema**) **rectangula** Bak. Plant small: stems many from a single point, forming a dense globose mass, up to 5 or rarely 7 cm. long, much branched: roots present: leaves densely distichous but often appearing polystichous due to the torsion and crowding of the stems, rarely over 2 cm. long; sheaths distinct, suborbicular, ca. 6 mm. long, glabrous except for the extreme apex, densely imbricate making the stem appear stout, scarious, several-nerved with broad nerveless margins; blades spreading or recurved, more or less contorted, triangular-subulate, 2 mm. thick, strongly angled, often distinctly keeled below, convolute above, acuminate, densely cinereous-lepidote with small nearly symmetrical subappressed

to reflexed-pruinose scales: scape distinct or almost none, slender, erect or ascending, up to 4 cm. long (Mez!) but usually not over 2 cm., apparently always terminal, glabrous, strongly angled, naked for most of its length or sometimes bearing an involute-clasping bract midway; scape-bracts lanceolate, acute or obtuse, several-nerved, even, subcoriaceous, glabrous or occasionally pale-appressed-lepidote, usually 2 in number, one at the extreme base of the scape and mostly hidden by the leaves, the other just below the inflorescence: inflorescence always of a single flower; floral bract like the upper scape-bract but smaller, much shorter than the sepals: flower subsessile, sepals elliptic-lanceolate, up to 10 mm. long, acute or obtuse, chartaceous, even, several-nerved, glabrous or scantly pale-lepidote, equally connate for about 2 mm. or the posterior suture barely longer than the 2 anterior ones; petals yellow (Osten!), 4.5 mm. longer than the sepals, blade subrhombic, obtuse, spreading at anthesis; stamens included, anthers basifixed, linear, obtuse, little more than 1 mm. long, filaments distinctly longer than the pistil; ovary subprismatic, tapering into the thick style, stigma capitate: capsule slenderly cylindric, up to 20 mm. long, abruptly contracted into a short beak.—Epiphytic and saxicolous; northern Argentina.—Bak. Journ. Bot. xvi. 238 (1878); xxv. 213 (1887); Hieron. Ic. & Descr. Argent. in Act. Acad. Cien. Cordoba, ii. 17 (1885); Bak. Brom. 160 (1889); Mez in DC. Mon. Phan. ix. 867 (1896); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 247 (1917); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 506 (1933). *T. propinqua* Gay var. *rectangula* Griseb. Symb. Argent. in Goett. Abh. xxiv. 335 (1879).—Pl. IV, fig. 19.

ARGENTINA: SALTA: Orán, 1906, *Spegazzini* (Castellanos!); CATAMARCA: near Recreo, *Tatter in herb. Kurtz 4333* (Mez!); CÓRDOBA: near Córdoba, *Lorentz 127 in part* (K, TYPE; phot. G); *126 in part* (BM); *Hieronymus 483* (FM); Sierra Chica, "El Zapato," near Capilla del Monte, alt. ca. 1000 m., 1918, *Osten 13472* (Ost); same, "Los Paredones," *Osten 13473* (Ost); same, 1923, *Osten 17764* (Ost); same, 1922, *Castellanos 1579* (G); dept. San Alberto, Yacanto, 1924, *Castellanos 1564* (G); near Merced, 1881, *Hieronymus* (US); indefinite, *Lossen 190* (G, FM, Mo, Mun); SAN LUIS: Bajo de Velis, 1895, *Kurtz 8472* (Castellanos!); San Francisco, Quebrada de Ramo, 1925, *Castellanos* (BA 25/624, G).

32. **Tillandsia** (§ **Diaphoranthema**) **Castellani** L. B. Smith. Plant up to 15 cm. high when in flower: stems simple or few-branched, many from a single point: roots present: leaves densely distichous, up to 45 mm. long; sheaths broadly ovate, strongly nerved, densely lepidote with a ciliate margin of elongate scales; blades spreading or reflexed, sublinear, terete, 2–3 mm. in diameter, pungent, densely

pruinose-lepidote with cinereous scales: scape evident, terminal or pseudo-axillary, naked, glabrous, slender: inflorescence 1–2-flowered; floral bracts ovate, broadly acute, glabrous, strongly nerved, distinctly shorter than the sepals: flowers subsessile; sepals equally subfree, lanceolate, acute or obtuse, up to 9 mm. long, glabrous, strongly nerved; petals, stamens and pistil unknown: capsule slenderly cylindric, 15–25 mm. long.—Saxicolous; northern Argentina.—L. B. Smith in Contrib. Gray Herb. civ. 80, t. 3, figs. 17–19 (1934).

ARGENTINA: Córdoba: Capilla del Monte, Los Paredones, 1922, *Castellanos 1576* (G, TYPE); same, alt. ca. 1000 m., 1918, *Osten 13474* (Ost); Cuesta de Atlantina, 1921, *Castellanos* (G); San Luis: Quebrada de Ramo in San Francisco, 1925, *Castellanos in hb. BA 25/618* (G).

33. **Tillandsia** (§ **Diaphoranthema**) **Gilliesii** Bak. Plant over 2 dm. long when in flower: stems many from a single point, forming a dense subglobose mass, up to 8 cm. long, simple or few-branched: roots present: leaves very densely distichous, 2–8 cm. long, densely subappressed-lepidote with cinereous to ferrugineous subsymmetrical scales; sheaths broadly oblong, many-nerved with no distinct margin, merging imperceptibly with the blade, lepidote except for the extreme base, densely imbricate making the stem appear 5–7 mm. thick, not overlapping behind the stem except at the extreme base; blades arching-recurved, often somewhat contorted, narrowly triangular, much compressed laterally, acuminate, with a very narrow triangular channel on the upper side: scape distinct or almost lacking, terminal or pseudoaxillary, up to 13 cm. long, appressed-lepidote, naked or bearing a single lanceolate involute bract: inflorescence 1–3-flowered, up to 38 mm. long, densely cinereous-lepidote; rhachis flexuous; floral bracts erect, lance-ovate, acute, up to 20 mm. long, equaling or exceeding the sepals or the uppermost sometimes slightly shorter, not more than twice as long as the internodes, not at all keeled, many-nerved, thin: flowers subsessile; sepals oblong-lanceolate, acute or obtuse, up to 16 mm. long, thin, many-nerved, lepidote, equally subfree; petals narrow; stamens deeply included, exceeding the pistil; ovary subglobose, slightly longer than the style: capsule slenderly cylindric, 25 mm. long, abruptly short-beaked.—Epiphytic; southern Peru and Bolivia, northern Argentina.—Bak. in Journ. Bot. xvi. 240 (1878); xxv. 213 (1887); Brom. 162 (1889); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 503 (1933). *T. compressa* Gillies ex Bak. in Journ. Bot. xvi. 240 (1878), in synon, non Bertero. *T. andicola* Gill. sensu Wittm. in Reiss & Steubel, Todtenfeld v. Ancon, t. 106, fig. 15 (non Gill.)—Pl. IV, figs. 10–12.

PERU: Arequipa: below Tingo, 1914, *Mr. & Mrs. J. N. Rose 19014* (US, NY); Arequipa, alt. 2500 m., 1926, *G. H. H. Tate 1196* (NY). BOLIVIA: Chuquisaca: prov. Cinti, Puca Khasa, near Tacaquira, 1934, *Hammarlund 313* (S); Camataqui, alt. 1800 m., 1932, *Cardenas 214* (G). ARGENTINA: Salta: Molinos, 1897, *Spegazzini 203* (Castellanos!); Tucuman: Valle de Santa Maria, Quebrada de Las Arcas, 1920, *Schreiter 1365* (Castellanos!); between Amaicha and Tiopunco, 1931, *Schreiter 7340* (Castellanos!); Catamarca: Quebrada de San Buenaventura, 1930, *Castellanos in hb. BA 30/409* (Castellanos!); La Rioja: Sierra Velazco, Los Colorados, 1879, *Hieronymus & Niederlein 508* (Castellanos!); Nonogasta, 1927, *Castellanos in hb. BA 27/1905* (G); San Juan: Sierra Pie de Palo, 1896, *Spegazzini 204* (Castellanos!); Mendoza: foot of the cordillera near Mendoza, 1825, *Gillies* (K, type; G, Cam); Precordillera, 1906, *Carette 1126* (Castellanos!); near Mendoza, 1914, *Sanzin 1125* (Castellanos!); Pilar, 1916, *Ruiz 324* (Castellanos!); Buenos Aires: Sierra Ventana, 1881, *Lorentz* (Ost, US); La Pampa: Naicó, 1927, *Castellanos in hb. BA 27/2880* (G).

Castellanos has reërected this species, which Mez reduced to the synonymy of *T. myosura*. As he did not publish his reasons in treating *T. Gilliesii*, I am taking the liberty of so doing here and illustrating from some excellent living material he sent.

*T. Gilliesii* has leaves that are much compressed laterally and leaf-sheaths that show no distinction from the blades except their position, while *T. myosura* has leaves that are practically terete and leaf-sheaths that are noticeably broader than the blades. Also the sheaths in *T. Gilliesii* have margins barely overlapping, while in *T. myosura* they are strongly so (see Pl. IV, figs. 11 & 14).

The type sheet of *T. Gilliesii* shows the whole range of variation from the longest scape recorded to practically none.

34. **Tillandsiia** (§ **Diaphoranthema**) **myosura** Griseb. Plant large for the section *Diaphoranthema*, flowering specimens occasionally 3 dm. or more high: stems many from a single point, forming a dense subglobose mass, up to 10 cm. long but usually only about 6 cm., simple or few-branched: roots present: leaves densely distichous, 5–17 cm. long; sheaths distinct, suborbicular to reniform, 10–15 mm. long, normally with the upper half densely lepidote like the blade but sometimes wholly glabrous, even in the glabrous phase with a fringe of narrow marginal scales, densely imbricate making the stem appear 5–8 mm. thick, their margins overlapping behind the stem for most of their length; blades strongly recurved and more or less contorted, triangular-subulate, 3–5 mm. in diameter, evenly rounded when fresh with a channel along most of the upper side, becoming strongly sulcate when dry due to the shrinkage of tissue between the nerves, acuminate, densely cinereous-lepidote with small basally produced subappressed to reflexed-pruinose scales: scape always distinct, erect, terminal, up to 20 cm. long, lepidote or glabrous, naked or with a

single lanceolate involute lepidote bract well removed from the inflorescence: inflorescence linear, up to 8 cm. long, laxly 1–8-flowered, densely cinereous-lepidote; rhachis slender, flexuous in the few-flowered specimens, but usually geniculate in the larger ones; floral bracts remote, rarely more than twice as long as the internodes and often much less, particularly in the many-flowered specimens, closely enfolding the calyx, not concealing the rhachis except by their extreme base, broadly ovate, acuminate, up to 21 mm. long, the lower ones equaling or exceeding the sepals, the upper ones often distinctly shorter, chartaceous, prominently many-nerved: flowers erect, closely appressed to the rhachis, subsessile; sepals oblong-lanceolate, acute or obtuse, 9–15 mm. long, thin, many-nerved, usually more or less lepidote, equally subfree; petals linear, up to 20 mm. long, yellowish white; stamens deeply included, exceeding the pistil; style short-cylindric, about as long as the ovary: capsule cylindric, abruptly short-beaked, up to 35 mm. long.—Epiphytic; southern Bolivia, Uruguay and northern Argentina.—Griseb. ex Bak. in Journ. Bot. xvi. 240 (1878); xxv. 213 (1887); Griseb. Symb. Argent. in Goett. Abh. xxiv. 333 (1879); Wittm. in Engl. & Prantl, Nat. Pflanzenf. ii. Abt. 4, 56 (1888); Bak. Brom. 163 (1889); Mez in DC. Mon. Phan. ix. 869 (1896); O. Ktze. Rev. Gen. iii. 304 (1898); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 245 (1917); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Herter, Florula Urug. 45 (1930); L. B. Smith, Not. Brom. in Ostenia, 361 (1933). *Tillandsia Nappii* Lorentz & Niederlein in Roca Exped. Rio Negro, ii. 282 (1881).—Pl. IV, figs. 13–15.

BOLIVIA: Potosi: dry *Mimosa*-forest formation, alt. 2600 m., 1927, *C. Troll 3369* (Mun). URUGUAY: 1890, *André K 326* (G). ARGENTINA: Salta: Cerro San Bernardo, 1919, *Hauman 1567* (G); dept. Guachipas, Alemania, alt. 1300 m., 1929, *Venturi 9977* (G, US); Tucuman: dept. Trancas, Tapia, 1919, *Schreiter 1029* (G); same, alt. 700 m., 1920, *Venturi 1178* (Ost); dept. Trancas, Vipos, 1921, *Schreiter in hb. BA 27/2336, 27/2348* (G); same, alt. 786 m., 1923, *Schreiter 2032* (Ost); Catamarca: Cerro del Arenal, 1917, *Jörgensen 1772* (G, US, Mo, Ost); La Rioja: dept. Famatina, Guanchin, alt. 1600 m., 1928, *Venturi 8096* (G); Córdoba: Estancia Germania near Cordoba, 1874, *Lorentz 122* (BM, type; B, phot. G, NY); Chacra de La Merced, 1881, *Hieronymus* (NY, S); Los Paredones near Capilla del Monte, alt. ca. 1000 m., 1918, *Osten 13480, 13481* (Ost); same, 1922, *Castellanos 1570* (G); Valle de Los Reartes, 1919, *Castellanos* (G, US, FM, Ost).

The original description of this species was drawn up by Baker and was based directly on the exsiccatae name on *Lorentz 122* from Cordoba. Grisebach republished the name a year later and based it on two collections. Then Lorentz and Niederlein distinguished these collections as separate species but gave the new name, *T. Nappii*, to that

collection which was already the type of *T. myosura*. Thus *T. Nappii* must inevitably fall into synonymy and whoever wishes to consider the two collections distinct species must propose another name for the second collection.

From an examination of the material cited above it appears that the distinctions proposed by Lorentz and Niederlein are of no value. The character of glabrous leaf-sheaths is often striking but may show transition to the lepidote type on a single plant. The indument on the scape is extremely variable and shows no correlation with other characters. It is a result of age and probably of habitat also.

The specimens with glabrous leaf-sheaths approach *T. retorta* in habit, and may possibly represent hybrids with the latter species.

35. **Tillandsia** (§ **Diaphoranthema**) **retorta** Griseb. Plant up to 15 cm. long when in flower but usually only half that long: stems many from a single point, forming a dense globose mass, usually much branched, 2–8 cm. long: roots present: leaves distichous, 3–5 cm. rarely up to 7 cm. long, densely cinereous-lepidote; sheaths suborbicular, prominently nerved with broad nerveless margins, normally glabrous with a ciliate margin of elongate scales but occasionally as lepidote as the blades, imbricate and making the stem appear 3–5 mm. thick; blades recurved and contorted, slender, terete, acuminate-pungent, barely over 2 mm. thick, prominently nerved when dry: scape terminal or pseudo-axillary, from almost none to 55 mm. long, but usually quite short, slender, densely lepidote, naked: inflorescence 1–2-flowered, densely cinereous-lepidote; rhachis produced behind the terminal flower; floral bracts erect, ovate, acute or acuminate, 10–12 mm. long, equaling or exceeding the sepals, slightly more than twice as long as the internodes in the several-flowered specimens, prominently nerved: flowers subsessile; sepals lance-oblong, acute, 10 mm. long, thin, prominently nerved, lepidote, much connate posteriorly; petals yellow (Venturi!), blade distinct, narrowly elliptic, 6 mm. long, much firmer than the claw; stamens deeply included, exceeding the pistil; ovary ellipsoid, stipitate, slightly shorter than the style, stigma capitate: capsule slenderly cylindric, abruptly short-beaked, 25–30 mm. long.—Epiphytic; northern Argentina.—Griseb. ex Bak. in Journ. Bot. xvi. 238 (1878); xxv. 213 (1887); Griseb. Symb. Argent. in Goett. Abh. xxiv. 334 (1879); Bak. Brom. 162 (1889); Mez in DC. Mon. Phan. ix. 868 (1896); O. Ktze. Rev. Gen. iii. 304 (1898); Spegazzini, Nov. Add. in An. Mus. Nac. B. A. ser. 2, iv. 171 (1902); Macloskie Rep. Princeton Univ. Exped. Patagonia, viii. 294 (1904); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat.

B. A. xxix. 247 (1917); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 506 (1933). *T. caespitosa* Gill. ex Bak. in Journ. Bot. xvi. 238 (1878), in synon. non LeConte. *T. Nappii* var. *Darwinii* Lorentz & Niederlein in Roca Exped. Rio Negro, ii. 282 (1881); Castellanos Brom. Arg. i., in Com. Mus. Nac. Hist. Nat. B. A. ii. 143 (1925).—Pl. IV, fig. 20.

ARGENTINA: TUCUMAN: dept. Trancas, between Tapia and Cadillal, alt. 700 m., 1920, *Venturi 1029 in part* (G); same, 1924, *Schreiter 4165* (Castellanos!); Vipos, alt. 786 m., 1923, *Schreiter 1368 in part* (Ost); same, 1921, *Schreiter 6599 in part* (Castellanos!); same, alt. 850 m., 1921, *Venturi 1371* (US); between Tapia and Raco, 1920, *Schreiter 1368 in part* (Castellanos!); Tapia, 1923, *Schreiter 6599 in part* (Castellanos!); Trancas, 1924, *Venturi 1029 in part; 2492; 3522* (Castellanos!); SANTIAGO DEL ESTERO: 1910, *Willis* (US); CÓRDOBA: Estancia Germania near Córdoba, *Lorentz 125* (BM, TYPE); near Córdoba, 1871, *Lorentz 70* (US); 1877, *Hieronymus 484* (US); Chacra de La Merced near Córdoba, 1881, *Hieronymus* (G, B, NY, SP); Sierra de Córdoba, 1875–6, *Hieronymus 348* (B); Cuesta de Las Minas, Potrero de Garay, Anisacate, 1895, *Kurtz 8626a* (NY, MN Rio); Dean Funes, 1916, *Sanzin 1158* (Ost); Sierra Chica, La Falda, alt. ca. 1000 m., 1918, *Osten 13458* (Ost); same, Los Paredones near Capilla del Monte, *Osten 13479* (Ost); same, Valle Hermoso, alt. ca. 950 m., *Osten 13484* (Ost, S); same, Rio Pintos, alt. 1000 m., *Osten 13493* (Ost); indefinite, 1877, *Hieronymus* (BM); *9; 146* (Mez!); *Lorentz 97* (Mez!); *Kurtz 1152, 6607* (Mez!); SAN LUIS: Alto de las Jarillas, 1882, *Galander 25* (B); Quebrada del Salado near La Bebida de Las Vacas, 1882, *Galander* (BM, S); MENDOZA: 1825, *Gillies* (K, type of *T. caespitosa;* Cam, G); San Rafael, Cañada Seca, 1921, *Ruiz in hb. BA 25/1862* (G); BUENOS AIRES: Laguna Salada de Narracó, 1879, *Lorentz & Niederlein* (B, type of *T. Nappii* var. *Darwinii;* phot. G); near Carmen de Patagones, *Spegazzini* (Spegazzini!); LA PAMPA: Naicó, 1931, *Monticelli* (Castellanos!); INDEFINITE: *Miers 1366* (BM).

*Tillandsia retorta* apparently forms frequent hybrids with other species. The probability of its crossing with *T. myosura* has already been noted. In hb. Osten, *Venturi 1371* from Vipos, Tucuman, is intermediate between the two having leaf-sheaths like typical *T. retorta* but a 3-flowered inflorescence and sepals that are sometimes equally subfree and sometimes posteriorly connate. Another specimen in hb. Osten, *Osten 13478*, was collected between specimens of *T. retorta* (*Osten 13479*) and *T. Castellani* (*Osten 13474*) and is evidently a hybrid of the two.

36. **Tillandsia** (§ **Diaphoranthema**) **andicola** Gillies. Plant up to 3 dm. long when in flower: stem more than 2 dm. long, much more than half the total length of the plant and several times longer than the leaves thus giving the plant a very distinctive habit, branching particularly near the apex: roots present: leaves rather laxly distichous or polystichous, up to 6 cm. long but usually only about 4 cm., densely subappressed-lepidote with basally produced cinereous scales; sheaths about 5 mm. apart on the stem, making the stem appear 3–4

mm. thick, suborbicular, much broader than the blades, several-nerved with a broad nerveless margin, ciliate with elongate scales, usually lepidote except for the extreme base, occasionally with a narrow glabrous strip next the margin or wholly glabrous in extreme age; blades recurving and more or less contorted, 2 mm. thick but acuminate and pungent, terete, strongly nerved when dry: scape terminal or pseudo-axillary, from almost none to 6 cm. long, densely lepidote, naked or with a single lanceolate involute acuminate lepidote bract: inflorescence 1- or rarely 2-flowered, densely lepidote; rhachis produced behind the terminal flower; floral bract lance-ovate, acuminate, up to 14 mm. long, exceeding the sepals, twice as long as the internode and not concealing the rhachis in the 2-flowered specimen, prominently nerved, not at all keeled, closely enfolding the calyx: flowers subsessile; sepals lance-oblong, acute, 11 mm. long, prominently nerved, joined posteriorly for half their length; petals narrow; stamens deeply included, exceeding the pistil.—Northwestern Argentina.—Gillies ex Bak. in Journ. Bot. xvi. 239 (1878); xxv. 213 (1887); Bak. Brom. 161 (1889); Mez in DC. Mon. Phan. ix. 871 (1896); Macloskie, Rep. Princeton Univ. Exped. Patagonia, viii. 293 (1904); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 242 (1917); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 498 (1933).—Pl. IV, fig. 18.

ARGENTINA: CATAMARCA: Cuesta de La Chilca, Agua de La Chilca, 1930, *Schreiter 1136* (G); MENDOZA: Andes of Mendoza, *Gillies* (K, TYPE; Cam, G); Crucesita, 1906, *Carette 1186* (G).

37. **Tillandsia** (§ **Diaphoranthema**) **Landbeckii** Phil. Plant up to 3 dm. long when in flower: stems densely massed, usually much branched, up to 2 dm. long, slender: roots present in small specimens, but apparently often lost in later development: leaves laxly distichous, 6–12 cm. long, densely subpruinose-lepidote with fine cinereous scales; sheaths elliptic, thin, few-nerved, densely lepidote except at the extreme base, 10–15 mm. long, laxly imbricate making the stem appear 2–4 mm. thick; blades more or less spreading, linear, terete, 1–1.5 mm. thick, soft with a weak point: scape terminal, erect, always prominent, up to 10 cm. long, 1 mm. or less in diameter, densely cinereous-lepidote; scape-bracts 2 or 3, immediately below the inflorescence, linear-lanceolate, acuminate or caudate-appendaged, densely lepidote: inflorescence 1–2-flowered; floral bracts like the scape-bracts but smaller, about equaling the sepals, pink (Murphy!) drying to violet: flowers subsessile, the second when present very close to the first; sepals elliptic, acute, 10 mm. long, thin, prominently

nerved, sparsely lepidote, equally subfree; petals ligulate, obtuse, yellow when dry; stamens deeply included, slightly exceeding the pistil; ovary about as long as the style: capsule slenderly cylindric, abruptly short-beaked, 22 mm. long.—Terrestrial and epiphytic; along the coast from Ecuador to northern Chile.—Phil. in Linnaea, xxxiii. 248 (1864), An. Univ. Chile, lix. 323 (1881); Cat. Pl. Chil. 279 (1881); Mez in DC. Mon. Phan. ix. 872 (1896); Reiche, Pflanzenverbreit. Chile in Engl. & Drude, Veg. d. Erde, viii. 178 (1907); I. M. Johnston in Contrib. Gray Herb. lxxxv. 22 (1929); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Reiche & Looser, Geog. Bot. Chile, 295 (1934). *T. recurvata* aut. non L.; Bak. in Journ. Bot. xvi. 239 (1878), in part; Brom. 162 (1889); L. B. Smith ex I. M. Johnston in Contrib. Gray Herb. xcv. 31 (1931).—Pl. IV, fig. 17.

ECUADOR: without definite locality, *Lehmann* (Mez!). PERU: ICA: foggy crests of San Gallan Island, clinging to lee-sides of rocks, alt. 300–440 m., 1919, *R. C. Murphy 3468* (G, Brooklyn); Viejas Island, on crumbling rocks at summit, 1919, *R. C. Murphy 3221* (Brooklyn). CHILE: ANTOFAGASTA: dept. Taltal, on shrubs and cactus on summit ridge, Cerro Perales ("Cerro del Hueso Parado" of Philippi) near Taltal, ca. lat. 25° 24′ S., alt. ca. 1000 m., 1925, *I. M. Johnston 5624* (G); ATACAMA: dept. Copiapó, vicinity of Caldera, Cerros de Copiapó, 1885, *E. E. Gigoux 59* (G); hills north of Copiapó, alt. ca. 800 m., 1925, *I. M. Johnston 5022* (G); COQUIMBO: Illapel, 1862, *Landbeck* (G, part of TYPE); same, *Philippi 969* (Bo); Choapa, *Philippi* (BM, DH).

38. **Tillandsia** (§ **Diaphoranthema**) **recurvata** L. Plant somewhat variable, 4–23 cm. long when in flower: stems densely massed, simple or few-branched, 1–10 cm. long, typically much shorter than the leaves but occasionally about equaling them: roots present: leaves distichous, 3–17 cm. long, densely pruinose-lepidote with cinereous or ferruginous scales; sheaths elliptic-ovate, thin, many-nerved with a broad hyaline nerveless margin, the extreme base glabrous, elsewhere densely lepidote and with a ciliate margin of elongate scales, imbricate and completely concealing the stem; blades typically recurved, sometimes only spreading or even erect, linear, terete, 0.5–2 mm. in diameter, rather soft with a weak point: scape terminal, always prominent, up to 13 cm. long, ca. 0.5 mm. in diameter; scape-bracts linear-lanceolate, lepidote, 1 or very rarely 2 immediately below the infloresecnce, sometimes one next the inflorescence and one remote: inflorescence typically 1–2- rarely up to 5-flowered, dense; floral bracts like the scape-bracts but smaller, typically equaling or longer than the sepals but often distinctly shorter, several-nerved, densely lepidote: flowers erect, subsessile; sepals lanceolate, usually acute, 4–9 mm. long, equally subfree, thin with 3 or more prominent nerves, typically glabrous but towards its southern limits somewhat

lepidote in an increasing proportion of specimens; petals narrow, pale violet or white, blade narrowly elliptic, obtuse; stamens deeply included, exceeding the pistil: capsule slenderly cylindric, abruptly short-beaked, up to 3 cm. long.—Terrestrial and epiphytic; southeastern United States to northern Argentina and Chile.—Sp. Pl. ed. 2, 410 (1762); Lam. Encycl. i. 618 (1785); Sw. Obs. Bot. 121 (1791); Willd. Spec. ii. 14 (1799); R. & P. Fl. Peruv. iii. 42, t. 271, fig. a (1802); Michx. Fl. Bor.-Am. i. 195 (1803); Ait. Hort. Kew, ed. 2, ii. 204 (1811); Pursh, Fl. Sept.-Am. i. 217 (1814); HBK. Nov. Gen. i. 291 (1816); Meyer, Fl. Esseq. 146 (1818); Nutt. Gen. i. 208 (1818); Lk. Enum. i. 308 (1821); LeC. in Ann. Lyc. Nat. Hist. N. Y. ii. 132 (1828); R. & S. Syst. vii. 1202 (1830); Gris. Fl. Br. W. Ind. 598 (1864); Chapm. Fl. South. U. S. 472 (1860); Bak. in Journ. Bot. xvi. 239 (1878); xxv. 213 (1887); Benth. & Hook. Gen. iii. 669 (1883); Hemsl. Biol. Centr.-Am. iii. 321 (1884); Wittm. in Engl. & Prantl, Pflanzenf. ii. Abt. 4, 56 (1888); Bak. Brom. 162 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 609 (1894); Mez in DC. Mon. Phan. ix. 872 (1896); Small, Fl. s. e. U. S. 245 (1903); W. J. Birge, Bull. Univ. Texas, no. 194 (1911); Boldingh, Fl. Ned. W.-I. 144 (1913); Hassler, Cons. & Jard. Bot. Genève, xx. 335 (1919); Britton & Wilson, Bot. P. Rico, v. 141 (1923); Herter, Fl. Urug. 45 (1930); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Standl. Field Mus. Pub. Bot. iii. 222 (1930); Castellanos, Physis, x. 88 (1930); An. Mus. Nac. Hist. Nat. B. A. xxxvii. 506 (1933). *Viscum Caryophylloides minus foliis pruinae instar candicantibus, flore tripetalo purpureo semine filamentoso* Sloane, Cat. 77 (1696); Ray, Hist. Pl. Suppl. 406 (1704); Sloane, Hist. i. 190, t. 121, fig. 1 (1707). *Renealmia foliis subulatis scabris; pedunculis unifloris* Royen, Lugd.-Bat. 25 (1740). *R. recurvata* L. Sp. Pl. 287 (1753), excl. var. β. *Tillandsia parasitica parva, pruinosa, scapo tenui bifloro* Browne, Jam. 194 (1756). *T. uniflora* HBK. Nov. Gen. i. 290 (1816). *Diaphoranthema uniflora* Beer, Brom. 154 (1857). *D. recurvata* ibid. 156. *Tillandsia monostachys* Gill. ex Bak. in Journ. Bot. xvi. 239 (1878), in synon., non L. *T. recurvata* forma *genuina* André, Brom. Andr. 65 (1889); formae *elongata, major, minor, contorta, caespitosa, brevifolia, argentea* ibid. *T. recurvata* var. *ciliata* E. Morr. ex Mez in Mart. Fl. Bras. iii. pt. 3, 610 (1894); var. *contorta* André ex Mez, ibid. 611; var. *minuta* Mez, ibid. *Phytarhiza ciliata* E. Morr. ex Mez in Mart. Fl. Bras. iii. pt. 3, 610 (1894), in synon. *T. cordobensis* Hieron. sensu Hassler, Fl. Pilc. in Trab. Mus. Farm. B. A. xxi. 41 (1909), non Hieron.—Ball moss; Bunch moss; Old man's beard; Nidos de gungulen (Porto Rico); Barba die Kadoesji and Marie die paaloe (Dutch West Indies).

UNITED STATES: Florida: Duval Co.: Jacksonville, *Curtiss 2849* (G, BM, NY); *4141* (DH, NY); *5054* (G, NY); St. Nicolas, *Lighthipe 624* (NY); Alachua Co.: Gainesville, *Garber* (G); *S. J. Knight 2* (NY); Volusia Co.: De Land, *G. B. Grant 1223* (NY); Lake Co.: Eustis, *Nash 1372* (G, NY); *Underwood 1352* (NY); Orange Co.: Orlando, *Canby* (G); *Harper 9* (G, NY); *Moldenke 5329* (NY); Brevard Co.: Merritts Island, *Curtiss 5772* (G, NY, Pom); Okeechobee region, *Fredholm 6058* (G); Pasco Co.: Odessa, *Blanton 6924* (Bailey); Pinellas Co.: Dunedin, *Tracy 6749* (G, NY); Lee Co.: Fort Myers, *Hitchcock 345* (G, NY); La Costa Island, *J. H. Simpson 360* (DH); Dade Co.: Miami, *Moldenke 535* (NY, S); Sykes Hammock, *Small, Mosier & Simpson 5776* (NY, S); Nixon-Lewis Hammock, *Small & Mosier 5886* (NY, S); Monroe Co.: Long Key, *Tracy 7521* (G, BM, NY); Key Largo, *Small & Carter 3117* (NY); indefinite: *Chapman* (NY); *Rugel 362* (NY, Pom); *Leavenworth* (G, NY); Texas: Travis Co.: Austin, *G. W. Letterman* (DH, NY, FM); *Rose & Russell 24130* (G); *H. H. York 52* (DH); Blanco Co.: Blanco, *E. J. Palmer 33962* (Mo, G, NY); Hays Co.: San Marcos, *Trelease* (Mo); Val Verde Co.: Devil River between Ozona and Comstock, *Ferris & Duncan 3037* (NY, Mo, DH, Pom); Brewster Co.: Chisos Mts., *C. H. Mueller 8576* (G, FM); *Ferris & Duncan 2801* (Mo, DH, NY); *Moore & Steyermark 3198* (G, NY); Comal Co.: New Braunfels, *Lindheimer 226* (G); *539* (G, NY, FM, Mo, Pom); *1200; 1201* (G, NY, FM, Mo, BM); Bandera Co.: *Reverchon 950* (Mo); Bexar Co.: San Antonio, *B. F. Bush 1271* (NY, Mo); *J. Clemens 144* (NY); *Farlow* (G); *G. Jermy* (NY); Uvalde Co.: *Milligan* (US); Karnes Co.: Gillett, *Munz 1467* (Pom); Victoria Co.: Victoria, *E. J. Palmer 9069* (S, Mo); Bee Co.: Beeville, *Bencke 5346* (G, FM); Nueces Co.: Corpus Christi, *A. Heller 1400* (NY); *H. Ravenel 172* (NY, Mo); Cameron Co.: Brownsville, *Ferris & Duncan 3194* (Pom, DH, Mo); *H. C. Hanson 479* (NY); Arizona: Santa Cruz Co.: Atascosa Mts., 20 miles n. w. of Nogales, *Phillips* (US); Patagonia Mts., *Bartram & Peebles 10611* (US). MEXICO: Tamaulipas: San Fernando, *Berlandier 818; 2238* (G); Matamoros, *Gregg* (G); Jaumave, *Rozynski 120* (FM); *251* (G, FM); Nuevo Leon: Monterrey, *Gregg* (G); near Pueblo Galeana, *Mueller 325* (G); Coahuila: Jimulco, *Pringle 219* (G); Saltillo, *E. Palmer 428* (G); Chihuahua: Mapula Mts., *Pringle 801* (NY, Mo, FM, BM, S); Sonora: Alamos, 1890, *E. Palmer 372* (G); Cochuto, *Hartman 74* (G, FM); Baja California: Playa Maria, *Anthony 96* (G, NY, S, FM, Mo, Pom, DH); between San Lucas and Todos Santos, *G. F. Ferris* (DH); Loreto, *W. S. W. Kew* (US); Sinaloa: Labrados, *Ferris & Mexia 5121* (DH); Villa Union, *Rose, Standley & Russell 13978* (US, NY); Mazatlan, 1849, *Strickland* (BM); Durango: Durango, *E. Palmer 640* (G, NY, FM, Mo, UCal, BM, Bo); Zacatecas: Santa Rosa and Cedros, *Kirkwood 42* (G); near Cedros, *Kirkwood 200* (FM); *Lloyd 55* (G, Mo); San Luis Potosi: San Luis Potosi, *Parry & Palmer 872 1/2* (G); *Schaffner 225 1/2* (NY, FM); *530* (G); Charcas, *Lundell 5479* (G); Vera Cruz: Orizaba, *Mueller 1756* (G, NY); Panuco, 1910, *E. Palmer 372* (G, Mo); Zacuapan, *Purpus 8223* (G, NY, Mo); Perote, *Schiede & Deppe* (BM); Vera Cruz, *Houston* (Cam); San Francisco near Vera Cruz, *C. L. Smith 1325* (G); Guanajuato: Guanajuato, *Duges* (G); Aguascalientes: Aguascalientes, *Deam 156* (G, FM); *J. G. Smith 183* (Pom, Mo); Nayarit: Santiago Ixcuintla, *Ortega 6149* (G, DH); Jalisco: Tuxpan, *Mexia 1029-a* (G, NY, FM, Mo, BM); Colima: Manzanillo, *Trelease* (Mo); Michoacan: Chapultepec, *Brandegee* (UCal); Morelia, *Arsène 5361* (Mo); Mexico: Valley of Mexico, *Bourgeau 96* (G, S); Federal District: Mexico City, *Lemmon* (UCal); Morelos: Cuernavaca, *Fröderström & Hultén 62; 159* (S); Puebla: San Luis Tultitlanapa, *Purpus 3394* (G, NY, FM, Mo, BM); Puebla, *Arsène 47* (S, Mo); *1298; 1840* (G, Mo); *2194m* (BM); *10124* (US); Guerrero: Chilpanzingo, *Humboldt & Bonpland* (P, type of *T. uniflora;* phot. G); Oaxaca: Ocotlán, *Conzatti & Gonzalez 1277* (G); Valle de Oaxaca, *Conzatti & Gonzalez 1168* (G);

YUCATAN: Silam, *Gaumer 659* (G, NY, FM, Mo, BM); San Anselmo, *Gaumer 1912* (G, S, FM, Mo, DH, BM, BA); Chichankanab, *Gaumer 1913* (FM); Merida, *Schott 35* (BM, FM); Izamal, *Greenman 401* (FM); INDEFINITE: *Berlandier 191* (G); *367* (BM); *1451* (G). SALVADOR: SAN SALVADOR: San Salvador, *Calderon 1505* (G, NY). NICARAGUA: MASAYA: Santiago Volcano, Masaya, *Maxon 7672* (US, NY). BAHAMAS: Eleuthera, *Britton & Millspaugh 5579* (NY, FM); Andros, *Brace 5051* (FM); *Northrop 617* (G, NY, FM); *Small & Carter 8652* (NY, FM); Cat Island, *Hitchcock* (FM); Watling's Island, *Britton & Millspaugh 6147* (NY, Mo); Great Exuma, *Britton & Millspaugh 3011* (G, NY, FM); Acklin's Island, *Brace 4450* (G, NY, FM); Inagua, *Nash & Taylor 914* (NY, FM). CUBA: ISLA DE PINOS: Sierra de Casas, *Ekman 12566* (S); Columbia, *Britton & Wilson 15634* (NY, FM); Caballos, *Jennings 194* (NY); PINAR DEL RIO: Pinar del Rio, *Palmer & Riley 77* (NY); Rio Portales, *Shafer 11196* (G, NY, Mo, FM); Los Palacios, *Shafer 11907* (NY); Sumidero, *Shafer 13379* (NY); Buenaventura, *Wilson 9353* (NY); Sierra de Anafe, *Wilson 11393* (NY); HAVANA: Sierra del Anafe, *Ekman 1122* (S); Guanabacoa, *Curtiss 586* (G, NY, FM, Mo, BM); Anafe, *Ekman 238* (G, FM, S); Arroyo Apulo, *Leon 637* (NY); Guines, *Van Hermann 190* (NY, FM); Santiago de las Vegas, *Van Hermann 392* (NY, FM); *704* (NY, FM, BM); MATANZAS: Matanzas, *Britton 240* (NY); Jumury, *Rugel 245* (NY, BM); SANTA CLARA: Rio San Juan, *Britton, Earle & Wilson 5848* (NY); Cieneguita, *Combs 580* (G, NY, FM, Mo); Soledad, *Jack 6220* (G, BA); *6268* (G); *6366* (G, S, FM); *6386; 6472* (G); Las Vegas de Matagua, Buenos Aires, *Jack 8739* (S); Sancti Spiritus, *Shafer 12091* (NY); Rinco to Banao, *Shafer 12320* (NY); CAMAGUEY: Loma de Loro, *Shafer 2642* (G, NY, FM, BM); Cayos Canal Nuevo, *Shafer 2665* (G, NY, FM, BM); ORIENTE: *Wright 687* (G, NY, Mo, S); *688* (G); Santiago de Cuba, *Ekman 8013* (G, S); *Millspaugh 1016* (FM); Holguin, *Shafer 1257* (NY); Guantánamo, *Ekman 2851* (S); San Juan Hill, *Shafer 12423* (NY, Mo). JAMAICA: 1687–9, *Sloane* (BM, TYPE); 1780–2, *Shakespear* (BM); *Swartz* (S); Santa Cruz Mts., *Britton 1322* (NY); Luana Point, *Britton 1518* (NY); Kingston, *S. Brown 388* (NY); Kingston to Waureka, *Maxon 10526* (S); Balaclava, *Perkins 1417* (G); Heathshire Hills, *Harris & Britton 10511* (FM). HAITI: Grande Cayemite, *Eyerdam 322* (G, FM); Navassa Island, *Rehder 21* (G); St. Michel de l'Atalaye, *Leonard 7178a* (US); Bombardopolis, *Leonard 13462* (G, US); Port Margot, *Nash 902* (NY); San Michel, *Nash & Taylor 1402* (NY); Jaimel, *Xavier* (BM). SAN DOMINGO: Amouroux, *hb. Nolte* (BM); Azua, *Rose, Fitch & Russell 3840* (NY). PORTO RICO: Desecheo Island, *Britton, Cowell & Hess 1576* (NY); Mona Island, *Britton, Cowell & Hess 1813* (NY); *Stevens 6442* (NY); Mayaguez, *Cowell 506* (NY, FM); *Sintenis 265* (G, NY, Mo, FM, BM, S); Coarmo, *Goll, Cook & Collins 752* (NY); *Heller 512* (NY, FM); *Sintenis 3023* (NY, Trin); Cabo Rojo, *Heller 4427* (G, NY, FM, Mo); *Stevens 2260* (NY); Guayama, *Kuntze 552a* (NY); *Underwood & Griggs 427* (NY); Santa Rita, *Stevenson 2256* (G, FM). LESSER ANTILLES: ST. CROIX: *Ricksecker 272* (G, NY); *Bentzen 6* (S); *Hornbeck* (S); *Thompson 968* (S); ST. MARTIN: *Rijgersmaa* (S); *Boldingh 2620* (NY); ST. BARTHOLOMEW: *Euphrasen* (S); *Forsström* (S); ST. KITTS: *Britton & Cowell 461* (NY); NEVIS: *Tobin* (BM); ANTIGUA: *Gregory* (BM); *Rose, Fitch & Russell 3303* (NY); *Shafer 33* (NY); *Bailey 177* (Bailey); MONTSERRAT: *Shafer 69* (NY, FM); GUADELOUPE: *Duss 3401* (NY); MARTINIQUE: *Duss 992a* (G, NY, FM, Mo); *Hahn 1029* (US); *1052* (BM); *1555* (BM, S); BONAIRE: *Boldingh* (NY); CURAÇAO: *Britton & Shafer 3024* (NY, FM); *Curran & Haman 57* (G). VENEZUELA: BOLIVAR: Isla Degrero, near Ciudad Bolivar, *Bailey 1780* (Bailey); NUEVA ESPARTA: Coche Island, *J. R. Johnston 14* (G); Margarita Island, *J. R. Johnston 219* (G, NY); SUCRE: Cristobal Colon, *Broadway 815* (G, NY); DISTRITO FEDERAL: Caracas, *Allart 12* (NY); *Bailey 6* (G, Bailey); *Pittier*

*9872* (G, NY); *11288* (NY); Cabo Blanco near La Guaira, *Curran & Haman 932* (G, US); *960* (G); ARAGUA: Colonia Tovar, *Fendler 1534* (G, NY, Mo); Maracay, *Vogl 1049* (Mun); CARABOBO: Puerto Cabello, *André 161 in part* (G, NY, FM); ZULIA: Lagunillas, *Jahn 961* (G); Maracaibo to Machiques, *Pittier 10544* (G). COLOMBIA: MAGDALENA: Tenerife, *André 161 in part* (G, NY, FM); NORTE DE SANTANDER: Toledo, *Killip & Smith 20122* (G, NY, FM, S); SANTANDER: Bucaramanga, *Killip & Smith 16391* (G, NY, FM, BM); ANTIOQUIA: Medellin, *Archer 384* (G, US); *Toro 79* (NY); CUNDINAMARCA: Fusagasuga, *André 161 in part* (FM); Quetamé, *hb. nac. Colombia* (G, US); La Esperanza, *Ariste Joseph B 85* (G); Pandi, *Pennell 2832* (G, NY); EL VALLE: Cali, *Lehmann 7767* (FM); La Paila, *Holton 154* (NY); Dagua, *Killip & Hazen 11081* (G, US, NY); Palmira, *Pennell & Killip 6172* (G, US, NY). ECUADOR: IMBABURA: Rio Chota, *Lehmann 646* (BM); Otavalo, *Hitchcock 20838* (G, NY). PERU: PIURA: Cerro Prieto, *Haught 215* (NY, BM, S); HUANUCO and JUNIN: *Ruiz & Pavon* (BM); LIMA: Chosica, *Macbride 2880* (G, FM); Matucana, *Macbride & Featherstone 457 in part* (G, FM, S); Obrajillo, *Mathews 650 in part* (G). BOLIVIA: EL BENI: Trinidad, alt. 250 m., 1926, *Werdermann 2530* (S); LA PAZ: Sorata, *Mandon 1177* (G, NY, S); *R. S. Williams 2424* (NY, BM); Apolo, *R. S. Williams 1485* (NY, US, BM); Illimani, *Buchtien 4143* (NY); SANTA CRUZ: Santa Cruz, *Steinbach 7452* (BM, FM, S, Mo). BRAZIL: PERNAMBUCO: Recife, *Pickel 14489* (SP); ALAGOAS: Paulo Affonso Falls, *Chase 7809* (US); MINAS GERAES: Lagoa Santa, *Warming* (Ko, type of var. *minuta;* phot. G); *Hoehne 6418, 6419* (MN Rio); Sabara, *Hoehne 6891, 6892* (MN Rio); Paraisopolis, *Hoehne 19181* (SP); RIO DE JANEIRO: Barra do Pirahy, *Hoehne & Gehrt 17329* (G, SP); SÃO PAULO: Pirajussára, *A. Gehrt 12379* (G, SP); Campinas, *Mosén 375* (S); *G. Gehrt 3532* (G, SP); Itapira, *Hoehne 20400* (G, SP); Serra Negra, *Hoehne 20707* (G, SP); Atibaia, *Lindberg 563* (S); São Paulo, *Löfgren 12380* (G, SP); Serra de Caracol, *Mosén 1736; 1737; 4441* (S); PARANÁ: Villa Velha, *Dusén 2763* (MN Rio); Porto Amazonas, *Dusén 9530* (NY); RIO GRANDE DO SUL: Porto Alegre, *Lindman A 255; A 1631a* (S); Piratinhý, *Lindman A 915* (S); Colonia Santo Angelo, *Lindman A 915b* (S); Santa Maria, *Lindman A 1631b* (S). PARAGUAY: Asuncion, *Balansa 618a* (Bo); *Lindman A 1855* (S); Ypacaray, *Hassler 1772* (NY); *Fiebrig 50* (G, FM, BM); Villa Rica, *Jörgensen 3964* (NY, FM, S, DH, Mo); *Lindman A 1777* (S); Pirapó, *Lindman A 1779* (S); San Antonio, *Lindman A 1783; A 1785* (S); central Paraguay, *Morong 492a* (G, NY, Mo, BM); San Bernardino, *Osten 8152b* (G, Ost); *8152* (Ost, S); *8922a* (Ost); Villa Encarnacion, *Rojas* (G, Ost); Carapeguá, *Rojas 203* (G, Ost); Rio Pilcomayo, El Chaco, *Lindman A 1895 1/2* (S); *Morong 292b; 876; 1085* (NY). URUGUAY: ARTIGAS: Arapey, *Osten 3291* (Ost); SALTO: *Schroeder* (Ost); CERRO LARGO: Palleros, *Herter* (Ost, S); SORIANO: Mercedes, *Osten 2943; 3054; 3120* (Ost); TREINTA Y TRES: Yerbal, *Herter 83393* (G); MINAS: Arequita, *Herter 88899* (G, Mo). ARGENTINA: FORMOSA: *Jörgensen 3395* (G, Mo, US); JUJUY: Laguna de la Brea, *Fries 414* (G, S); SALTA: San Carlos, *Venturi 7292* (US); *7293* (G, US); TUCUMAN: Naranjal, *Schreiter 749* (Ost); Yerba Buena, *Schreiter 27/2363* (G); *Venturi 268* (G, S, Ost); El Duraznito, *Venturi 2797* (G, US, FM, S); *2798* (G, S, Ost); SANTA FE: Sante Fe, *Castellanos 24/1218* (G); BUENOS AIRES: Buenos Aires, *Gillies* (K, type of *T. monostachys;* BM, G); *Tweedie* (BM); San Fernando, *Pennington* (G, SP). CHILE: *Cuming* (Mez!).

The typification of *Tillandsia recurvata* is quite simple, since Linnaeus had no material of his own when he originally published it as *Renealmia recurvata,* and gave but two references. These are based on the same plant since the Royen reference is nothing but a repetition of the Sloane one.

It has not been possible to check the record of this species from Chile and there is some doubt if it actually occurs there.

*T. recurvata* shows considerable variation from the West Indian form which is taxonomically typical to the form in the extreme southern part of its range. This southern form is smaller and more slender in habit, and has lepidote sepals which often exceed the bracts. Usually it is 1-flowered. Although the difference between the extremes is striking, the intergradations are manifold and it seems impossible to define any satisfactory categories within the species.

Mez has cited *Tillandsia Bartramii* Ell. under the synonymy of both *T. recurvata* and *T. tenuifolia*. The type of *T. Bartramii* in the Charleston Museum is obviously identical with *T. tenuifolia* and its supposed relation to *T. recurvata* must be the result of misinterpretation.

*Venturi 2801* from El Duraznito, Tucuman, Argentina, is evidently a hybrid of *T. recurvata* and *T. bandensis* both of which occur in the same locality. The specimens of that number show various degrees of variation between the two species in the density of the inflorescence and its amount of indument.

39. **Tillandsia** (§ **Diaphoranthema**) **capillaris** R. & P. Plant very variable in both size and form, up to 16 cm. long when in flower: roots present: stems many from a single point, densely massed, simple or branched: leaves distichous, mostly 1–4 cm. long, rarely shorter or up to 9 cm. long, densely and finely pruinose-lepidote with cinereous to ferrugineous scales; blades erect to spreading, straight or rarely contorted, linear and less than 2 mm. thick or narrowly triangular and thicker according to the form represented; sheaths usually elliptic, thin, several-nerved, densely lepidote except where covered by the next below: scape from almost none to 8 cm. long, mostly slender, always naked, glabrous or slightly lepidote toward apex, developed almost wholly after anthesis: inflorescence normally 1-flowered, rarely 2-flowered; floral bracts ovate, acute or apiculate, thin with 3 or more strong nerves, densely lepidote to glabrous, usually equaling or exceeding the sepals: flowers subsessile; sepals lanceolate, acute or obtuse, up to 8 mm. long, connate posteriorly; petals narrow with blade scarcely distinct, white, yellow or brown; stamens deeply included, exceeding the pistil.—Saxicolous and epiphytic; Peru and Bolivia to central Argentina and Chile.—R. & P. Fl. Peruv. iii. 42, t. 271, fig. c (1802); Spreng. Syst. ii. 23 (1825); R. & S. Syst. vii. 1201 (1830); Wittm. in Engl. & Prantl, Nat. Pflanzenf. ii. Abt. 4, 56 (1888); Bak. Journ. Bot xvi. 238 (1878); xxv. 213

(1887); Brom. 161 (1889); Mez in DC. Mon. Phan. ix. 878 (1896); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930). *Diaphoranthema capillaris* Beer, Brom. 153 (1857). *Tillandsia lanuginosa* Gill. ex Bak. in Journ. Bot. xvi. 237 (1878), in synon. *T. capillaris* var. β. *lanuginosa* Mez in DC. Mon. ix. 879 (1896).—HUACHUACSSO, HUAYHUAÇO (Peru).

This very variable species has a number of forms whose extremes are easily differentiated, but which show all degrees of intergradation in any large collection. All doubtful cases are kept under the typical form in this treatment. The following key defines the principal forms:

1. Floral bracts with at least 5 strong nerves meeting near the apex.
   2. Scapes evident after anthesis and mostly exceeding the leaves.
      3. Floral bracts glabrous or scantly and deciduously lepidote: scapes conspicuously pseudo-axillary.
         4. Leaves slender and elongate, not over 2 mm. thick, obtuse, loose and spreading.....a. Forma *typica*
         4. Leaves short and stout, mucronate, appressed and ascending so that they form an almost continuous plane..b. Forma *incana*.
      3. Floral bracts densely and persistently lepidote: scapes usually but not invariably terminal: leaves widely spaced so that the greater part of each sheath is uncovered..c. Forma *cordobensis*.
   2. Scapes never elongating much even after anthesis, mostly shorter than the leaves.....d. Forma *virescens*.
1. Floral bracts with only 3 strong nerves meeting near the apex, other nerves if any short and with free apices.....e. Forma *Hieronymi*.

a. Forma **typica**, forma nov. foliis angustis elongatisque: scapis elongatis, pseudo-axillaribus: bracteis florigeris 5- vel pluri-nervatis, glabris vel subglabris.

PERU: *Ruiz & Pavon* (BM, TYPE; phot. G); *Dombey 162 in part* (Mez!); HUANUCO: Huanuco, alt. 2300 m., 1922, *Macbride & Featherstone 2035* (G, FM, US, BM); LIMA: Matucana, alt. 2700 m., 1922, *Macbride & Featherstone 457 in part* (G, FM); 1914, *Rose 18661* (G, US, NY); JUNIN: Tarma, *Mathews 650 in part* (K); Oroya, 1919, *Kalenborn 177* (G, US); Tarma, alt. 3000–3200 m., 1929, *Killip & Smith 21785; 21940* (US, G, NY); CUZCO: Ollantaitambo, alt. 2900–3100 m., 1915, *Cook & Gilbert 550* (US); 1925, *Pennell 13659* (G, FM); Mollepata, valley of the Apurimac, alt. 2750 m., *F. L. Herrera 1206* (Herrera!); Cuzco, 1914, *Rose 19033* (US); Sicuani, alt. 3551 m., 1903, *Hicken 10* (S). BOLIVIA: LA PAZ: Omasuyos near Achacache, alt. 4000 m., 1858, *Mandon 1181* (BM); Cotaña to Illimani, alt. 2450 m., 1911, *Buchtien 4026* (G); Rio Abajo, Huaricana, La Paz, alt. 2700 m., 1910, *Buchtien 807* (FM); below Obraje, alt. 3300 m., *Buchtien 6383* (US); La Paz, 1918, *Buchtien 381 in part* (S); COCHABAMBA: Cochabamba, alt. 2700 m., 1909, *Buchtien 2416* (US, NY); SANTA CRUZ: Santa Cruz, alt. 600 m., 1892, *Kuntze* (NY); TARIJA: San Luis, 1864, *Pearce* (BM); Escayo, alt. 3600 m., 1904, *Fiebrig 3570* (BM); Tarija, alt. 2000 m., 1932, *Cardenas 211; 215* (G). ARGENTINA: JUJUY: dept. Ledesma, Sierra de Calilagua, alt. 700 m., 1927, *Venturi 7295* (US); Quinta near Laguna de la Brea, 1901, *Fries 418* (S); TUCUMAN: dept. Tafi, Naranjal, 1918, *Schreiter 796* (Ost); alt. 500 m., 1923, *Schreiter 3289* (Ost); dept. Trancas, Tapia, alt. 500 m., 1918, *Schreiter 804* (Ost); alt. 680 m., 1923, *Schreiter 3292* (Ost); dept. Trancas, Vipos, alt. 800 m., 1922, *Venturi*

*1903* (G, US, Ost); alt. 780 m., 1923, *Schreiter 3290* (Ost); near la Hoyada, alt. 1000 m., 1920, *Venturi 1314* (US); Trancas, 1922, *Schreiter 27/2358* (G, BA); Sierra de la Candelaria, alt. 1000 m., 1924, *Venturi 3519* (US); Quebrada de Lules, 1922, *Schreiter 27/2359* (G, BA); Tucuman, alt. 400 m., 1922, *Venturi 1970* (G, BA, S, Ost); dept. Burroyaes, Alto de las Salinas, alt. 900 m., 1922, *Venturi 1971* (US); CÓRDOBA: La Falda, Sierra Chica, alt. 1000 m., 1918, *Osten 10578; 13459* (Ost); *13462* (Ost, S); MENDOZA: foot of the cordillera near Mendoza, 1823, *Gillies* (K, type of *T. lanuginosa;* phot. G).

b. Forma **incana** (Gill.), comb. nov. *Tillandsia incana* Gill. ex Bak. in Journ. Bot. xvi. 238 (1878), in synon. *T. propinqua* var. β. *saxicola* Hieron. Ic. & Descript. Argent. 16, t. 3, fig. 4 (1885), in part. *T. capillaris* γ. *incana* Mez in DC. Mon. Phan. ix. 879 (1896).

BOLIVIA: POTOSI: prov. Nor Chichas, near Chorolque, alt. 3900 m., 1931, *Cardenas 91* (G); Potosi, alt. 4000 m., 1932, *Cardenas 209* (G). ARGENTINA: TUCUMAN: dept. Tafi, Sierra de San Javier, alt. 1100–1200 m., 1921, *Venturi 1515* (G, US); *1516* (G); Quebrada de la Hoyada, 1921, *Schreiter 27/2356* (G, BA); dept. Trancas, Vipos, alt. 800 m., 1922, *Venturi 1917* (G, S); alt. 786 m., 1923, *Schreiter 3288* (Ost); CATAMARCA: dept. Andalgalá, La Junta, 1917, *Jörgensen 1582* (G, US, Mo, BA); CÓRDOBA: *Lossen 187* (G, FM, Mo, Bailey); Quebrada del Chorro, east of los Gigantes, Sierra Chica, 1878, *Hieronymus* (B, type of *T. propinqua* var. *saxicola*); Valle Hermoso, Sierra Chica, alt. 950 m., 1918, *Osten 13486* (FM, Ost); 1917, *Osten 10579* (Ost); near Capilla del Monte, Sierra Chica, alt. 1000 m., 1918, *Osten 13466* (Ost); *13476* (Ost, S); *13477* (Ost); 1922, *Castellanos 1575* (G, BA); near La Falda, Sierra Chica, 1918, *Osten 13488; 13489* (Ost); Rio Pintos, Sierra Chica, 1918, *Osten 13496* (Ost); MENDOZA: foot of the Cordillera near Mendoza, *Gillies* (K, TYPE; phot. G).

c. Forma **cordobensis** (Hieron.), comb. nov. *Tillandsia cordobensis* Hieron. Ic. & Descript. Argent. 10, t. 3, fig. 1 (1885); Mez in DC. Mon. Phan. ix. 875 (1896); O. Kuntze, Rev. Gen. iii. 303 (1898); Hicken, Chloris Platensis, 62 (1910); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 243 (1917); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 500 (1933). *T. recurvata* L. sensu Griseb. Pl. Lorentz. in Goett. Abh. xix. 225 (1874); Symb. Argent. in Goett. Abh. xxiv. 334 (1879), non L.

BOLIVIA: LA PAZ: near Sorata, alt. 2600 m., 1858, *Mandon 1177 in part* (NY); Ingenio del Oro, alt. 3300 m., 1886, *Rusby 2165* (G, FM). ARGENTINA: CHACO: Colonia Benitez, 1916, *Muello* (Castellanos!); JUJUY: 1892, *Kuntze* (NY); Cuyaya, 1922, *Inostrosa 2338* (Castellanos!); dept. Capital, Cerro de los Perales, 1903, *Holmberg* (Castellanos!); SALTA: Rio de San Carlos, San Carlos, alt. 1000 m., 1927, *Venturi 7290* (G, US); Cerro de Cachi, San Carlos, alt. 2000 m., 1927, *Venturi 7294* (G); dept. Guachipas, Alemania, alt. 1400 m., 1929, *Venturi 9985* (G); TUCUMAN: Anfama, alt. 1800 m., 1906, *Monetti* (Ost); Tapia, 1920, *Schreiter 27/2347* (G, BA); dept. Famailla, Villa Nougues, alt. 1000 m., 1922, *Venturi 1900* (G, US); 1927, *Venturi 5476* (G); CATAMARCA: Andalgalá, 1917, *Jörgensen 1581* (G, US, Mo, Ost); LA RIOJA: Yerba Buena, Cerro Famatina, 1928, *Castellanos 28/104* (G, BA); CÓRDOBA: *Lossen 191* (G, FM, Mo, Bailey); Sierra Achala, *Hieronymus 349* (B, TYPE); Puerto Alegre, Sierra Achala, 1877, *Hieronymus* (US); Sierra Chica, Cuesta del

Pan de Azucar, 1887, *Hieronymus* (S); Los Gigantes, 1890, *Kurtz 6927* (NY); La Falda, Sierra Chica, alt. 1000 m., 1917, *Osten 10580a* (Ost); 1918, *Osten 13457* (Ost, S); *13487* (Ost); Valle Hermoso, Sierra Chica, alt. 1000 m., 1917, *Osten 10581* (Ost); Rio Pintos, Sierra Chica, alt. 1000 m., 1918, *Osten 13491* (Ost).

Grisebach and later authors have frequently confused this form with dwarf specimens of *T. recurvata*, because of the close habital resemblance. However, there need be no difficulty in distinguishing the two if it is kept in mind that *T. recurvata* always has two bracts beneath the lowest flower, the floral bract and a scape-bract, while *T. capillaris* has but the floral bract.

d. Forma **virescens** (R. & P.), comb. nov. *Tillandsia virescens* R. & P. Fl. Peruv. iii. 43, t. 270, fig. b (1802); Spreng. Syst. ii. 23 (1825); R. & S. Syst. vii. 1200 (1830); Bak. Brom. 161 (1889); Mez in DC. Mon. Phan. ix. 879 (1896); Reiche, Pflanzenverbreit. Chile in Engl. & Drude, Veg. d. Erde, viii. 164 (1907); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 248 (1917); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Reiche & Looser, Geog. Bot. Chile, 257 (1934). *T. propinqua* Gay, Fl. Chil. vi. 15 (1853); E. Morr. in Belg. Hort. xxiii. 234 (1873); Phil. in An. Univ. Chile, lix. 323 (1881); Cat. Pl. Chil. 279 (1881); Bak. Journ. Bot. xvi. 237 (1878); xxv. 213 (1887); Brom. 160 (1889). *Diaphoranthema virescens* Beer, Brom. 154 (1857). *Tillandsia pusilla* Gill. ex Bak. in Journ. Bot. xvi. 237 (1878); xxv. 213 (1887); Brom. 160 (1889); Mez in DC. Mon. Phan. ix. 877 (1896); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 506 (1933). *T. lichenoides* Hieron. Ic. & Descript. Argent. 17 (1885). *T. Stolpi* Phil. in An. Univ. Chile, xci. 614 (1895). *T. Williamsii* Rusby, Bull. N. Y. Bot. Gard. vi. 489 (1910). *T. dependens* var. *Sanzini* Hicken in Physis, i. 388 (1914); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 244 (1917).

PERU: HUANUCO: *Ruiz & Pavon* (TYPE; Madrid (?), not yet discovered in any herbarium); LIMA: Rio Blanco, alt. 3000–3500 m., 1929, *Killip & Smith 21640* (G, NY); JUNIN: Casacancha to Culnai, *Wilkes Expedition* (G, US); Tarma to Oroya, alt. 2700 m., 1903, *Weberbauer 2555* (S); Oroya, 1924, *F. L. Stevens 14* (US); CUZCO: near Cuzco, alt. 3300–3500 m., 1922, *F. L. Herrera 47* (Herrera!); alt. 3500 m., 1924, *F. L. Herrera 821* (US); 1916, *C. Watkins* (US); AREQUIPA: near Arequipa, alt. 2500 m., 1901, *R. S. Williams 2530* (NY, US, BM); Yura, alt. 2800 m., 1901, *R. S. Williams 2539* (NY, type of *T. Williamsii*); PUNO: near Puno, alt. 3125 m., 1919, *Mrs. R. S. Shepard 48* (G); INDEFINITE: *Dombey 162 in part; C. Gay 546; Meyen; Stuebel* (Mez!). BOLIVIA: LA PAZ: near La Paz, alt. 3300 m., 1885, *Rusby 2164* (NY, FM, US); 1889, *Bang 123* (G, US, NY, Mo, BM); 3650–3800 m., 1906, *Buchtien 155 in part* (US); *805 in part* (S); 1910, *Buchtien* (Ost); *Buchtien 805 in part* (US, NY); *2556* (NY); 1911, *Buchtien* (NY); 1913, *Buchtien* (G, FM); 1918, *Buch-*

*tien 107* (G); *381* (Mo, Pom, BM, S); 1930, *Jaffuel 585* (G); Ullama to Challapa, alt. 4000 m., 1921, *Asplund 6382* (US); COCHABAMBA: Cochabamba, alt. 3000 m., 1892, *Kuntze* (NY); ORURO: Pazña, alt. 4200 m., 1908, *Buchtien 1271* (US). ARGENTINA: JUJUY: La Rinconada, alt. 3800 m., 1901, *Claren 11343* (S); Tilcara, alt. 3400 m., 1927, *Venturi 7638* (G); Moreno, alt. 3500 m., 1901, *Fries 682a* (S); Abra de Tactul, alt. 4000 m., 1901, *Fries 689* (S); Los ANDES: Susques, 1927, *Castellanos 27/773* (G, BA); SALTA: Guachipas, 1873, *Lorentz & Hieronymus 1180* (S, B, type of *T. lichenoides;* phot. G); dept. Candelaria, Sierra de la Candelaria, alt. 1100 m., 1924, *Venturi 8666* (US); dept. San Carlos, Cerro de Cachi, alt. 2500 m., 1927, *Venturi 7302* (US); same, alt. 3000 m., *Venturi 7296* (US); TUCUMAN: 1933, *Burkart 5376* (G, SP); dept. Tafi, Peñas Azules, alt. 3800 m., 1933, *Parodi 10889* (G); Valle de Tafi, alt. 2000 m., 1918 and 1923, *Schreiter 805; 3287* (Ost); LA RIOJA: Cerro Famatina, Cienaga de Cosme, 1928, *Castellanos 28/101* (G, BA); Cerro Famatina, Guanchin, 1928, *Castellanos 28/103* (G, BA); MENDOZA: *Gillies* (K, type of *T. pusilla;* phot. G); 1921, *Hosseus* (S); dept. Las Heras, alt. 2800 m., 1913, *Sanzin 56* (Ost, phot. G); 1916, *Sanzin 25/1868* (G, BA); Precord San Ignacio, alt. 1300 m., 1915, *Sanzin 567* (Ost). CHILE: COQUIMBO: *Gay* (P, type of *T. propinqua;* phot. G); near Illapel, 1914, *Rose 19256* (US, NY); ACONCAGUA: Llayllay, 1832, *Bridges 534* (K, phot. G; BM); O'HIGGINS: dept. Victoria, Naltagua, 1888, *Stolp* (Chile, type of *T. Stolpi;* phot. G); INDEFINITE: *Cuming 167* (BM, K, phot. G); *Philippi 968* (P).

*Sanzin 56*, cited above, is probably the type collection of *T. dependens* var. *Sanzini*, but unfortunately there is no number cited in the type description.

e. Forma **Hieronymi** (Mez), comb. nov. *Tillandsia Hieronymi* Mez in DC. Mon. Phan. ix. 876 (1896); Kuntze, Rev. Gen. iii. 304 (1898); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 244 (1917); Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 503 (1933). *T. propinqua* Gay sensu Griseb. Symb. Argent. in Goett. Abh. xxiv. 334 (1879); Hieron. Ic. & Descript. Argent. t. 3, figs. 2–3 (1885); Bak. Brom. 160 (1889), in part. non Gay. *T. dependens* Hieron. ex Mez in DC. Mon. ix. 880 (1896); Hauman & Vanderveken, Phan. L'Arg. i., in An. Mus. Nac. Hist. Nat. B. A. xxix. 244 (1917); Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2, xv a. 122 (1930). Vars. *perusneoides* and *percordobensis* Mez, ibid. 881; Hauman & Vanderveken, ibid. Formae *perusneoides* and *percordobensis* Castellanos, Brom. Arg. iv., in An. Mus. Nac. Hist. Nat. B. A. xxxvii. 500 (1933).

BOLIVIA: LA PAZ: Palca to Illimani, alt. 3600–4300 m., 1906, *Hauthal* (S); TARIJA: Tarija, alt. 2000 m., 1932, *Cardenas 212* (G). ARGENTINA: JUJUY: Quinta, near Laguna de la Brea, 1901, *Fries 34* (S); dept. San Pedro, Sierra Santa Barbara, alt. 750 m., 1929, *Venturi 9743 a* (G); SALTA: dept. Candelaria, Sierra de la Candelaria, alt. 1000–1150 m., 1924, *Venturi 4079; 8668* (US); TUCUMAN: dept. Leales, Chañar Pozo, alt. 300 m., 1919, *Venturi 736* (G); Vipos, 1922, *Venturi 1228* (G, BA); dept. Trancas, Tapia, alt. 750 m., 1921, *Venturi 1364* (US); CATAMARCA: dept. Santa Maria, Portezuelo to Las Animas, alt. 3000 m., 1925, *Venturi 6890* (US); LA RIOJA: Cerro Famatina, Cienaga de Cosme, 1928 *Castellanos 28/102* (G, BA); Sierra Famatina,

Guanchin, 1928, *Castellanos 28/105* (G, BA); CÓRDOBA: 1891, *Kuntze* (NY); *Hieronymus 124* (B, TYPE; FM, US, phot. G); *422* (Mez!); *870* (B); *Hieronymus & Niederlein; Kurtz 4398; 6667; Lorentz 124; 126 in part; 127 in part; 868; Lorentz & Hieronymus 527* (Mez!); *Kurtz 6597* (NY); Cuesta del Pan de Azucar, Sierra Chica, 1881, *Hieronymus* (NY); Sierra de Córdoba, *Hieronymus 352* (B, type of *T. dependens* var. *percordobensis;* phot. G); 1876, *422* (S); Cerro Champagni, near Rio Cobre, Sierra Achala, 1877, *Hieronymus 781* (B, type of *T. dependens* var. *perusneoides;* FM, US, phot. G); Dean Funes, 1916, *Sanzin 1159* (Ost); La Falda, Sierra Chica, alt. 1000 m., 1917–8, *Osten 10580-b* (Ost); *13460* (Ost, S); *13461* (Ost); Los Paredones near Capilla del Monte, Sierra Chica, alt. 1000 m., 1918, *Osten 13475* (Ost); Huerta Grande, Sierra Chica, alt. 1000 m., 1918, *Osten 13482* (Ost); Valle Hermoso, Sierra Chica, alt. 950 m., 1918, *Osten 13483; 13485* (Ost); Cajon de Rio Primero near San Antonio, Sierra Chica, alt. 900 m., 1918, *Osten 13490* (Ost); SAN LUIS: Quebrada del Salado, near Bebida de las Vacas, 1882, *Galander* (S); Villa Mercedes, 1926, *Castellanos 25/2779* (G, BA); Merlo to Rincon, 1929, *Tepes 29/67* (G, BA).

It seems doubtful if the material which Mez described under *T. dependens* is really a hybrid with *T. usneoides* as he thought. To be sure the stem and leaves are somewhat more elongate than in other specimens of *T. capillaris,* but there is no tendency toward alternation of long and short internodes on the stem and consequent exposing of portions of the internodes such as one might expect in any hybrid involving *T. usneoides.*

40. **Tillandsia** (§ **Diaphoranthema**) **usneoides** L. Plant growing pendent from trees in branching strands up to 8 m. long: roots absent: stem sympodial, less than 1 mm. in diameter, internodes 3–6 cm. long with only the extreme base covered by the leaf-sheath, strongly curved, pseudo-axillary branches really a continuation of the main axis, very short and concealed by the basal leaf-sheath, bearing 2–3 leaves: leaves distichous, 25–50 mm. long, densely cinereous- or ferrugineous-lepidote; sheaths elliptic, involute, up to 8 mm. long; blades filiform, less than 1 mm. in diameter: scape practically none: inflorescence reduced to a single pseudo-terminal flower; floral bract ovate, apiculate or caudate, densely lepidote, shorter than the sepals: flower subsessile; sepals narrowly ovate, acute, up to 7 mm. long, thin, strongly nerved, glabrous, equally short-connate; petals narrow, acute or obtuse, 9–11 mm. long, pale green or blue; stamens deeply included, exceeding the pistil: capsule up to 25 mm. long, cylindric, abruptly short-beaked.—Always epiphytic; southeastern United States to central Argentina and Chile, but apparently very rare or absent in the Amazon Basin.—Sp. Pl. ed. 2. 411 (1762); Lam. Encycl. i. 619 (1785); Willd. Spec. ii. 15 (1799); R. & P. Fl. Peruv. iii. 43 (1802); Michx. Fl. Bor.-Am. i. 195 (1803); Poir. Encycl. vii. 672 (1806); Pursh, Fl. Sept.-Am. i. 217 (1814); Meyer, Fl. Esseq.

146 (1818); Nutt. Gen. i. 208 (1818); Ell. Bot. S. Car. & Ga. i. 379 (1821); LeC. in Ann. Lyc. Nat. Hist. N. Y. ii. 132 (1828); R. & S. Syst. vii. 1199 (1830); Gray, Man. ed. 2, 458 (1856); Beer, Brom. 151 (1857); E. Morr. in Belg. Hort. xxvii. 313, t. 17 (1877); Hook. f. in Bot. Mag. ciii. t. 6309 (1877); F. von Hoehnel in Dingler's Polytechn. Journ. n. 234. 407 (1879); Benth. & Hook. Gen. iii. 669 (1883); Hemsl. Biol. Centr.-Am. iii. 322 (1884); Wittm. in Engl. & Prantl, Nat. Pflanzenfam. ii. Abt. 4, 56, t. 27 (1888); Bak. Journ. Bot. xxv. 212 (1887); Brom. 159 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 613 (1894); Mez in DC. Mon. Phan. ix. 881 (1896); Britton & Brown, Ill. Fl. i. 374, t. 904 (1896); J. Huber, Bolet. Mus. Para. iii. 328 (1902); F. H. Billings, Bot. Gaz. xxxviii. 99 (1904); Pulle, Pl. Surinam, 92 (1906); Boldingh, Fl. Ned. W.-I. 144 (1913); Hassler, Cons. & Jard. Bot. Genève, xx. 336 (1919); J. Weese in Wiesner, Rohstoffe, n. 4. 649 (1927); Harms in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, xv a. 122 (1930); Herter, Fl. Urug. 45 (1930); Standl. Field Mus. Pub. Bot. iii. 222 (1930); x. 129 (1931). *Camanbaya* Marcgrav. Bras. 46 (1658); Petiv. Gaz. t. 62, fig. 12 (1709). *Cuscuta, ramis arborum innascens Caroliniana, filamentis lanugine tectis* Pluken. Alm. 126 (1696) and Phytogr. t. 26, fig. 5 (1691); Moris. Hist. Oxon. iii. 615 (1715). *C. lendiginosa tenuissime cirrhis* Pluken. Alm. 126 (1696) and Phytogr. t. 26, fig. 6 (1691). *C. americana super arbores se dissidens* Ray, Hist. Pl. ii. 1904 (1693). *Viscum Caryophylloides tenuissimum, e ramulis arborum musci in modum dependens, foliis pruinae instar candicantibus, flore tripetalo, semine filamentoso* Sloane, Cat. 77 (1696); Ray Hist. Pl. Suppl. 406 (1704); Sloane, Hist. i. 191, t. 122, figs. 2–3 (1707). *Renealmia filiformis intorta* L. Hort. Cliff. 129 (1737); Gron. Virg. 36 (1739); Royen, Lugd.-Bat. 25 (1740); Barrère, Aequin. 99 (1741). *Fucus filum* Esper, Fuc. t. 20 (1800). *Rhizomorpha ochreata* Achar. Syn. 391 (1814). *Renealmia usneoides* L. Sp. Pl. 287 (1753). *Tillandsia trichoides* HBK. Nov. Gen. i. 290 (1816); R. & S. Syst. vii. 1200 (1830); Beer, Brom. 153 (1857). *T. filiformis* Lodd. Catal. ex R. & S. Syst. vii. 1229 (1830). ? *T. pendula* Hort. Lovan. ex R. & S. Syst. ibid. *Dendropogon usneoides* Raf. Fl. Tellur. iv. 25 (1838); Small, Fl. s. e. U. S. 245 (1903); Britton & Brown, Ill. Fl. ed. 2, i. 456, t. 1146 (1913); Britton & Wilson, Bot. P. Rico, v. 138 (1923). *Strepsia usneoides* Steud. Nomencl. ed. 2, ii. 645 (1841). *Tillandsia crinita* Willd. ex Beer, Brom. 152 (1857). *T. usneoides* formae *genuina, longissima, filiformis, major, ferruginea, crispa* André, Brom. Andr. 64 (1889). Forma *cretacea* Mez in Mart. Fl. Bras. iii. pt. 3, 615 (1894). Forma *robusta* E. Morr. ex Mez, ibid. Var. β. *filiformis* Mez

in DC. Mon. Phan. ix. 883 (1896); var. γ. *ferruginea* Mez, ibid; Castellanos, Physis, x. 89 (1930); var. δ. *longissima* Mez in DC. Mon. Phan. ix. 883 (1896); var. ε. *robusta* Mez, ibid.; var. ζ. *cretacea* Mez, ibid.—SPANISH MOSS; LONG MOSS; BLACK MOSS; OLD MAN'S BEARD; BARBA ESPAÑOLA (Central America); PASHTE (Honduras); MEXNUXIB; MEEXNUXIB; SOSCILCHAC (Yucatan); GUATACA (Cuba); BARBA DE UCAR (Porto Rico); BARBA DO VELHO; BARBA DE PÁO; BARBA DEL MONTE (Brazil); BARBA DE MONTE; BARBA DE TALA; BARBA DE PALO; BARBA DE VIEJO (Uruguay); BARBON (Chile); CRIN VÉGÉTAL (French); BAUMHAAR; HANGENDES MOOS (German).

UNITED STATES: VIRGINIA: Northampton Co.: Eastville, *Canby* (Mo); Princess Anne Co.: Virginia Beach, *N. L. Britton* (NY); *Vail* (NY); Knott's Is., *Harper 10* (NY, FM); Norfolk Co.: Dismal Swamp, Lake Drummond, *Leonard & Killip 412* (FM); Norfolk, *Durand* (G); *E. G. Britton* (NY); NORTH CAROLINA: Beaufort Co.: Leechville, *Wiegand & Manning 724* (G); Craven Co.: Lake Ellis, *Brown 110* (US); Havelock, *Fogg 5525* (G); Bladen Co.: *Ashe 2388* (NY); Elizabethtown, *Heller 14081* (FM); New Hanover Co.: Wrightsville, *Biltmore hb. 4701 a* (G, NY, Mo, BM); Forsyth Co.: Winston-Salem, *Schallert* (NY); Iredell Co.: Statesville, *Hyams* (Pom); SOUTH CAROLINA: Williamsburg Co.: Kingstree, *Wiegand & Manning 725* (G); Georgetown Co.: Santee Canal, *Ravenel* (S); Dorchester Co.: Summerville, *Taylor* (G); Charleston Co.: Edisto Is., *Murray 1299* (NY); Beaufort Co.: Bluffton, *Mellichamp* (US, Mo); GEORGIA: Richmond Co.: Augusta, *Olney & Metcalf 98* (G); McIntosh Co.: Darien, *Gilbert* (NY); *H. H. Smith 2140* (FM); Glynn Co.: Brunswick, *Chapman 472* (G); Charlton Co.: St. Marys River, *Small* (NY, FM); Sumter Co.: Flint River, *Harper 1048* (G, NY, Mo, BM); Dougherty Co.: Albany, *Gillespie 10000* (Bailey); Thomas Co.: Thomasville, *Clarke* (NY); FLORIDA: Duval Co.: *Fredholm 103* (Pom); *5231* (G); Jacksonville, *Churchill* (G); *Curtiss 2850* (G, NY, BM); *4142* (NY); *4673* (G, NY); *Keeler* (NY); St. Nicholas, *Lighthipe 58* (NY); Alachua Co.: Gainesville, *Garber* (G); *Knight 7883* (NY); Volusia Co.: New Smyrna, *Deam 1605* (NY); Enterprise, *Faxon* (G); Ormond, *Gilbert* (G); Lake Co.: Eustis, *Nash 464* (G, NY); *1932* (NY); Orange Co.: Winter Park, *Ensminger* (G); *Lewton* (NY); Brevard Co.: Cape Canaveral, *Burgess 689* (NY); Pinellas Co.: Tarpon Springs, *Wilson* (NY); Hillsborough Co.: Tampa, *Merrill* (NY); Palm Beach Co.: Juno, *Randolph & Small 61* (G); Lee Co.: Ft. Myers, *Hitchcock 348* (G, NY); *Standley 157* (G, NY); Dade Co.: Miami, *Moldenke 538* (NY, S); Elliott's Key, *Small & Nash* (NY); Cutler, *Small & Carter* (NY); Miami R., *Small 4537* (NY); Leon Co.: Tallahassee, *Rugel 380* (NY, BM); ALABAMA: Elmore Co.: Tallassee, *Harper 80* (G, NY, Mo, Bailey); Montgomery Co.: Montgomery, *McCarthy* (G); Mobile Co.: Mobile, *Dewey* (G); *Graves 863* (Mo); MISSISSIPPI: Hinds Co.: Clinton, *Smart* (G); Adams Co.: Natchez, *Shimek* (FM, Mo); Jackson Co.: Ocean Springs, *Pollard 1080* (G, NY, FM, Mo, Pom); Harrison Co.: Biloxi, *Baker* (NY); *Tracy* (NY, FM, BM); Hancock Co.: Bay St. Louis, *Munz 1369* (Pom); LOUISIANA: St. Tammany Co.: Mandeville, *Pennell 4202* (NY); Plaquemines Co.: Myrtle Grove, *Benke 5523* (G, FM); Rapides Co.: Alexandria, *Ball 504* (G, NY, FM, Mo, BM); St. Landry Co.: Melville, *Bush 251* (NY); East Baton Rouge Co.: *Joor* (FM); St. Martin Co.: St. Martinville, *Langlois* (Bailey); Orleans Co.: New Orleans, *Benke 3182* (FM); TEXAS: Walker Co.: *Dixon 607* (FM, Pom); Dido, *Dixon 185* (FM); Huntsville, *Bailey* (Bailey); Montgomery Co.: Willis, *Dixon 282* (FM); Harris Co.: Houston, *Kuntze 23819* (NY); Brazos Co.: College Station, *Kellogg* (Mo);

Travis Co.: Austin, *Underwood* (NY); Hays Co.: San Marcos, *Trelease* (Mo); Comal Co.: New Braunfels, *Lindheimer 1202; 1203* (G, NY, FM, Mo, BM); Kendall Co.: *Reverchon 4036* (G, NY, Mo); Bexar Co.: San Antonio, *Bell* (NY); *Clemens 145* (Mo, Pom, Bailey); *Jermy 198* (G); Brazoria Co.: Columbia, *Bush 211* (NY, Mo); Brazoria, *Stewart* (G); Maverick Co.: Eagle Pass, *Plank* (NY); Nueces Co.: Corpus Christi, *Ravenel 171* (NY); Cameron Co.: Brownsville, *Ferris & Duncan 3176* (NY, Mo, Bailey). MEXICO: TAMAULIPAS: Tampico, *Lachen 96* (BM); *Palmer 183* (G, NY, FM, Mo, BM); *Mercier* (S); Gómez Fárias, *Palmer 359* (G, NY, Mo, FM); Jaumave to Victoria, *Rozynski 252* (FM); NUEVO LEON: near Pueblo Galeana, *Mueller 326* (G); BAJA CALIFORNIA: *Palmer* (Mo); SINALOA: Mazatlan, *Lamb 378* (NY, Bo); *379* (G, DH); *Ortega 6841* (FM); DURANGO: Durango, *Palmer 124* (G, NY, FM, Mo, UCal, BM, Bo, S); SAN LUIS POTOSI: Los Canos, *Palmer 229* (G, NY, FM, Mo); VERA CRUZ: Maltrata, *Kerber 262* (BM); Vera Cruz, *Houston* (Cam); Orizaba, *Mueller 347* (NY); NAYARIT: Pedro Paulo, *Rose 2004* (G); MICHOACAN: Chapultepec, *Berlandier 46 a* (BM); *Brandegee* (UCal); *Gregg* (G, Mo); *Bourgeau 95* (G, S); MEXICO: Amecameca, *Fröderström & Hultén 1206* (S); Valley of Mexico, *Schmitz* (BM); *Schaffner* (BM); FEDERAL DISTRICT: Mexico City, *Tenfer* (NY); TLAXCALA: Santa Ana, *Arsène 7* (Mo); PUEBLA: San Luis Tultitlanapa, *Purpus 3395* (G, NY, FM, Mo, BM, S); Cerra de Pinas, *Russell & Sowiron 238* (US); GUERRERO: Acapulco, *Palmer 537* (G, NY, FM, Mo); CHIAPAS: San Vicente, *Nelson 3504* (G); YUCATAN: Silam, *Gaumer 663* (G, NY, FM, BM, S). GUATEMALA: PETEN: Lake Yaxha, *Lundell 2210* (G); BAJA VERAPAZ: Sierra de las Minas, *Kellerman 6282* (FM); Santa Rosa, *Tuerckheim 325* (G); *II 2333* (NY); GUATEMALA: Guatemala, *Hayes* (G); SANTA ROSA: Santa Rosa, *Heyde & Lux 4633* (G). HONDURAS: ATLÁNTIDA: Tela, *Standley 56702* (FM); COMAYAGUA: Siguatepeque, *Standley 56070* (G, FM); OLANCHO: Salama, *Weaver 2* (NY). NICARAGUA: *Wright* (Mo). COSTA RICA: CARTAGO: Turrialba, *Pittier & Tonduz 8246* (Bo); *Polakowsky 498* (BM); Cartago, *Polakowsky 99* (BM). BAHAMAS: 1730, *Dale* (BM); New Providence Is., *Britton & Brace 238* (NY, FM); Cat Is., *Britton & Millspaugh 5965* (NY, FM); Inagua Is., *Nash & Taylor 1179* (NY, FM). CUBA: ISLA DE PINOS: Rio Nuevas, *Jennings 292* (BM); Sierra de Casas, *Ekman 12567* (S); McKinley, *Jennings 301* (NY); PINAR DEL RIO: Bañas San Vicente, *Britton & Gager 7380* (NY); Galafre, *Britton & Cowell 9831* (NY); Los Palacios, *Shafer 11817* (NY, Mo); Sumidero, *Shafer 13818* (NY, FM); Sierra de Anafe, *Wilson 11442* (NY); HAVANA: Loma Esperon, *Ekman 672* (S); Sierra de Anafe, *Ekman 1123* (G, Mo, S); Rincon, *Wilson 1059* (G, NY, FM); MATANZAS: Matanzas, *Britton & Shafer 238* (NY); SANTA CLARA: Cieneguita, *Combs 343* (G, NY, FM, Mo); CAMAGUEY: La Gloria, *Shafer 105* (NY, FM); Cayo Guajaba, *Shafer 723* (NY, FM); ORIENTE: *Wright* (G); Cabo Cruz, south of Niquero, *Ekman 16187* (S); Rio Rioja, *Ekman 4884* (Mo, FM, BM, S); Woodfred, *Ekman 15577* (G, S); Santiago, *Pollard & Palmer 275* (G, NY, FM, Mo); *Taylor 110* (NY); Farallon de La Perla, *Shafer 8778* (NY). JAMAICA: 1687–90, *Sloane* (BM, TYPE; phot. G); *Swartz* (S); Bridgehill, *Bot. Dept. Jamaica* (BM). HAITI: Anse Galette, Gonaive Is., *Leonard 3048* (NY); Gros Morne, dept. L'Artibonite, *Leonard 10018* (US); La Vallée, Tortue Is., *Leonard 15323* (US); Port Margot, *Nash 374* (NY); Marmelade, *Nash & Taylor 1239* (NY). SAN DOMINGO: Azua, *Rose, Fitch & Russell 3821* (NY); Constanza, *Tuerckheim 3062* (NY, BM); Moncion, Monte Cristi, *Valeur 262* (NY, FM, Mo, S); *788* (US). PORTO RICO: Coamo Springs, *Britton & Cowell 1330* (NY, FM); Ponce to Coamo, *Heller 513* (NY, FM); Mayaguez, *Hunn* (Bailey); Cabo Rojo, *Sintenis 569* (G, NY, S); Aguirre, *Underwood & Griggs 365* (NY). LESSER ANTILLES: ST. CROIX: *Ricksecker 267* (G, NY, FM, Mo); ST. MARTIN: *Boldingh 3416* (NY); GUADELOUPE: *Duss 3322* (NY); MARTINIQUE: *Duss 993* (NY);

*Forsström* (S); ST. VINCENT: *H. H. & G. W. Smith 1429* (NY); TRINIDAD: *Fendler 813* (BM); *R. Bot. Gard. Trin. 822* (Trin.); *Sieber 345* (Mo). SURINAM: Paramaribo *Samuels 45* (G, NY). BRITISH GUIANA: *Schomburgk 159* (BM); BERBICE: Canje Creek, *Bartlett* (Jenman). VENEZUELA: SUCRE: Cristobal Colon, *Broadway 50* (G, NY); MANAGAS: Caripe, *Humboldt & Bonpland 347* (B, P, type of *T. trichoides* and *T. crinita;* phot. G); DELTA AMACURO: Corisal, *Bond, Gillin & Brown 199* (G); DISTRITO FEDERAL: Caracas, *Bailey 574* (G, Bailey); ARAGUA: Colonia Tovar, *Fendler 1535* (G, NY, Mo, S); MERIDA: Tabay, *Gehriger 431* (NY, FM); Timotes, *Vogl 1043* (Mun). COLOMBIA: BOLIVAR: Cartagena, *Triana 534* (BM); NORTE DE SANTANDER: Toledo, *Killip & Smith 20121* (G, NY, FM); SANTANDER: Bucamaranga, *Killip & Smith 16348* (G, NY, FM, S); CUNDINAMARCA: Fusagasuga, *André 1860* (G, NY); Pandi, *Pennell 2836* (NY); EL VALLE: La Paila, *Holton 155* (NY). ECUADOR: *Spruce 5435* (G, BM); AZUAY: Cuenca, *Rose 22943* (G, NY); ORO: Machala, *Barclay 515* (BM); LOJA: El Tambo to La Toma, *Hitchcock 21325* (G, NY). PERU: *Ruiz & Pavon* (BM); PIURA: Cerro Prieto, *Haught F-124* (FM); HUANUCO: Huanuco, *Macbride & Featherstone 2378* (G, FM, S); LIMA: Matucana, *Rose 18671* (NY); CUZCO: Valle del Paucartambo, *Herrera 3378* (G, FM); Cuzco, *Herrera 820* (FM). BOLIVIA: LA PAZ: Sorata, *Mandon 1182* (G); La Paz, *Bang 107* (G, NY, FM, Mo, BM); *Buchtien 155 in part* (G); *599* (NY, FM, Mo, Pom, S); *Jaffuel 583* (G); Illimani, *Buchtien* (BM); CHUQUISACA: prov. Cinti, Huarinota, Quebrada Honda, alt. 3200 m., *Hammarlund 375* (S). BRAZIL: CEARÁ: *Allemão CLXXI in part* (MN Rio); *Allemão & Cysneiros 1524* (MN Rio); PERNAMBUCO: Jaqueira, *Ridley, Lea & Ramage* (BM); BAHIA: *Glocker 198* (S, BM); MINAS GERAES: Caldas, *Regnell III 1251* (S, FM, MN Rio); Lagoa Santa, *Hoehne 6353* (MN Rio); Turvo, *Hoehne & Gehrt 17574* (G, SP); RIO DE JANEIRO: Nictheroy, *Smith & Brade 2328* (G); FEDERAL DISTRICT: Rio de Janeiro, *Andersson* (S); *Forsett 93* (S); *Mosén 2622* (S); *Widgren* (S); SÃO PAULO: Moóca, *Brade 6310* (S); *6311* (G, S, SP); Butantan, *Hoehne 12* (G, SP); Santos, *Luederwalt & Fonseca 12383* (G, SP); Piracicaba, *Puttemans 12382* (G, SP); Piquete, *Robert* (BM); Ytú, *Russell 17975* (G, SP); Cubãtao, *Smith 2041* (G, S, FM); São Paulo, *Smith & Kuhlmann 1811* (G); PARANÁ: Restinga Secca, *Dusén 3130* (S, MN Rio); Serrinha, *Dusén 17673* (G, S, BM); Tibagy, *Reiss 16* (G); SANTA CATHARINA: *Macrae* (BM); RIO GRANDE DO SUL: Porto Alegre, *Lindman A 469* (S). PARAGUAY: *Jörgensen 4483* (Mo, DH, S); Pilcomayo River, *Morong 886* (NY, FM, Mo, BM). URUGUAY: ARTIGAS: Arapey, *Osten 3287* (Ost); CERRO LARGO: Palleros, *Herter* (Ost); TREINTA Y TRES: Tacuari, *Herter 94037* (G, Mo); RIO NEGRO: *André K 325* (G, NY, FM); SORIANO: Mercedes, *Osten 3121* (Ost). ARGENTINA: JUJUY: Sierra de Santa Barbara, 1901, *Fries 413* (S); TUCUMAN: La Cienaga, *Lorentz 798* (G, BM, SP); CÓRDOBA: *Lossen 428* (G, FM, Mo, Bailey); Sierra Grande, *Hieronymus* (FM); Sierra Achala, *Hieronymus* (NY); Los Gigantes, *Kurtz 6928* (NY); BUENOS AIRES: Barca Grande, Delta del Paraná, *Cabrera 1635* (G, SP). CHILE: ACONCAGUA: Quillota, *Bertero 1359* (G); Zapallar, *Behn* (FM); Valparaiso, *Dusén* (S); *King* (BM); Cerro Campana, *Looser 581* (G); Palos Quemados, *Looser 2760* (G); Quilpue, *Philippi & Borchers* (BM); BIOBIO: Santo Barbaro, *Reed* (BM); Rio Duqueco, *Reed* (G); CAUTIN: Temuco, *Claude-Joseph 1173* (US).

Considering its wide range, *T. usneoides* varies remarkably little and then without any discernible relation to its distribution. If the forms and varieties so far proposed are worth keeping then there is practically no limit to those that can and logically should be made. Consequently the species is considered here without any subdivision whatever.

Since no material of this species can be found in either the Linnean or Clayton collections, the type, like that of *T. recurvata*, must rest on Sloane's material.

Prof. Harms informs me that there is no specimen labelled *Tillandsia crinita* at Berlin-Dahlem, but that the specimen labelled *T. trichoides* in Willdenow's herbarium is the one that Beer described as *T. crinita*.

## Explanation of Plates.

### Plate I.

Fig. 1. Guzmania Hitchcockiana L. B. Smith (*Hitchcock 20436*), branch of inflorescence × ½.
2. Hechtia Meziana L. B. Smith (*Purpus 10276*), scape and lowest branch of inflorescence × ½.
3. Same, longitudinal section of flower × 2.
4. Hohenbergia inermis Mez (*Britton 1468*), petal and stamen × 5.
5. Hohenbergia caymanensis Britton (*Rothrock 495*), spike from near apex of inflorescence × ½.
6. Same, sepal × 3.
7. Hohenbergia negrilensis Britton (*Britton & Hollick 2023*), spike × ½.
8. Same, floral bract × 2.
9. Hohenbergia stellata Schult. f. (*Martius*), flower × 1.
10. Mezobromelia bicolor L. B. Smith (*Killip 11396*), inflorescence × ½.
11. Same, corolla × 2.
12. Canistrum perplexum L. B. Smith (*Hoehne 31550*), inflorescence × ½.
13. Same, expanded sepal × 1.
14. Same, petal and stamens × 2.
15. Same, diagrammatical cross-section of petal and filaments × 10.
16. Puya lasiopoda L. B. Smith (*Rusby 2232*), floral bract and flower × ½.
17. Same, expanded sepal × 1.
18. Pitcairnia kniphofioides L. B. Smith (*Lehmann 3310*), inflorescence × ½.

### Plate II.

Fig. 1. Puya sanctae-crucis (Bak.) L. B. Smith (*Castelnau*), floral bract and flower × 1.
2. Tillandsia lepidosepala L. B. Smith (*Pringle 5323*), habit × ½.
3. Same, sepal × 1.
4. Tillandsia caulescens Brongn. (*Gay 1186*), habit × ¼.
5. Tillandsia argentina C. H. Wright (*Venturi 2494*), habit × ½.
6. Same (*Venturi 9978*), sepal × 1.
7. Same, petal and stamens × 2.
8. Tillandsia incarnata HBK. (*Humboldt & Bonpland*), habit × ¼.
9. Same (*Killip & Smith 19767*), posterior sepals × 1.
10. Same (*Rimbach 121*), petal and stamens × 2.
11. Tillandsia Friesii Mez (*Fries 828*), habit × ½.

## Plate III.

Fig. 1. Tillandsia cauligera Mez (*Weberbauer 4050*), habit × ¼.
2. Tillandsia arhiza Mez (*Balansa 4746*), habit × ¼.
3. Same (*Balansa 4747*), inflorescence × ½.
4. Tillandsia Werdermannii Harms (*Werdermann 717*), inflorescence and upper part of scape × ½.
5. Tillandsia Cardenasii L. B. Smith (*Cardenas 491*), habit × ½.
6. Same, expanded sepal × 1.
7. Tillandsia Ehrenbergiana Kl. (*Ehrenberg 860*), habit × ½.
8. Same, expanded sepal × 1.
9. Tillandsia Schiedeana Steud. (*Lundell 2517*), scape and inflorescence of small specimen × ½.

## Plate IV.

Fig. 1. Tillandsia Funckiana Bak. (*Jahn 1088*), short branch with 2 flowers × ½.
2. Tillandsia erecta Bak. (*Gillies*), habit × ½.
3. Tillandsia caerulea HBK. (*Humboldt & Bonpland*), upper scape and inflorescence × ½.
4. Same (*Hitchcock 21334*), petal × 1.
5. Tillandsia bryoides Griseb. (*Aurelius 23*), habit × ½.
6. Same, leaf × 2.
7. Same (*Osten 5107*), inflorescence × 2.
8. Tillandsia aizoides Mez (*Osten 13471*), leaf × 2.
9. Same (*Hieronymus & Niederlein 850*), inflorescence × 2.
10. Tillandsia Gilliesii Bak. (*Gillies*), habit × ½.
11. Same (*Castellanos 27/2880*), leaf × ½.
12. Same, cross-section of leaf-blade × 2.
13. Tillandsia myosura Griseb. (*Venturi 8096*), scape and inflorescence × ½.
14. Same (*Schreiter 27/2336*), leaf × ½.
15. Same, cross-section of leaf-blade × 2.
16. Tillandsia angulosa Mez (*Hieronymus & Niederlein 851*), habit × 1.
17. Tillandsia Landbeckii Phil. (*Landbeck*), inflorescence and upper scape × 1.
18. Tillandsia andicola Gill. (*Schreiter 1136*), habit × ½.
19. Tillandsia rectangula Bak. (*Castellanos 25/624*), end of stem with inflorescence × ½.
20. Tillandsia retorta Griseb. (*Venturi 1029*), habit × ½.
21. Tillandsia crocata (E. Morr.) Bak. (*Dusén 9238*), habit × ½.
22. Same (*Tweedie 427*), inflorescence and upper scape × ½.

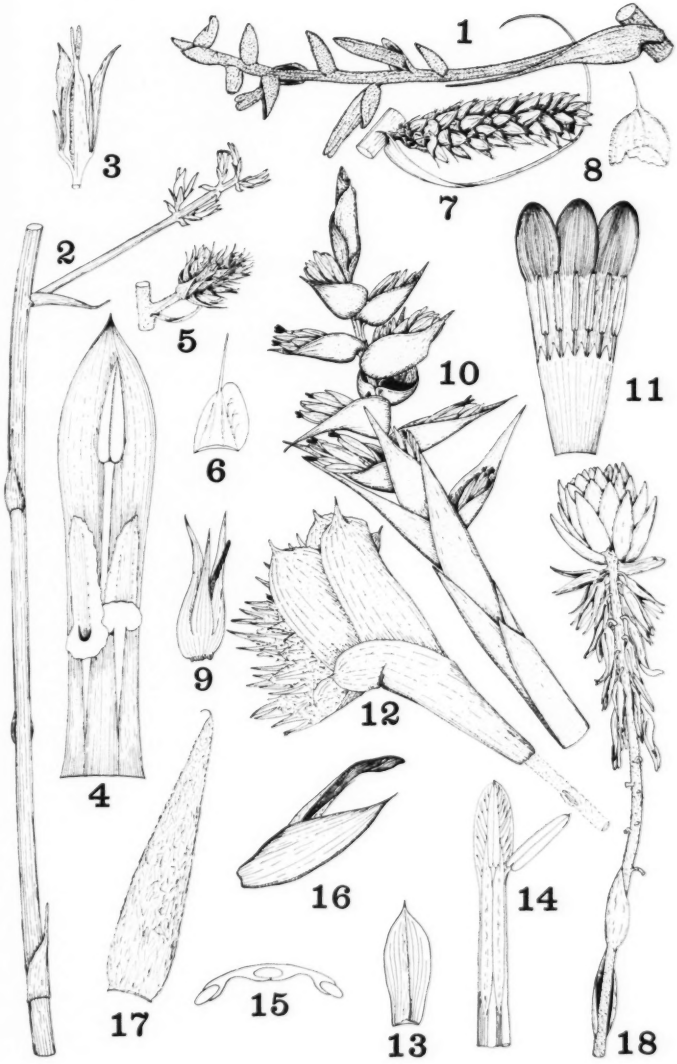


Fig. 1, GUZMANIA HITCHCOCKIANA L. B. Sm.; 2–3, HECHTIA MEZIANA L. B. Sm.; 4, HOHENBERGIA INERMIS Mez; 5–6, H. CAYMANENSIS Britton; 7–8, H. NEGRILENSIS Britton; 9, H. STELLATA Schult. f.; 10–11, MEZOBROMELIA BICOLOR L. B. Sm.; 12–15, CANISTRUM PERPLEXUM L. B. Sm.; 16–17, PUYA LASIOPODA L. B. Sm.; 18, PITCAIRNIA KNIPHOFIOIDES L. B. Sm.

UNIV. OF MICH.

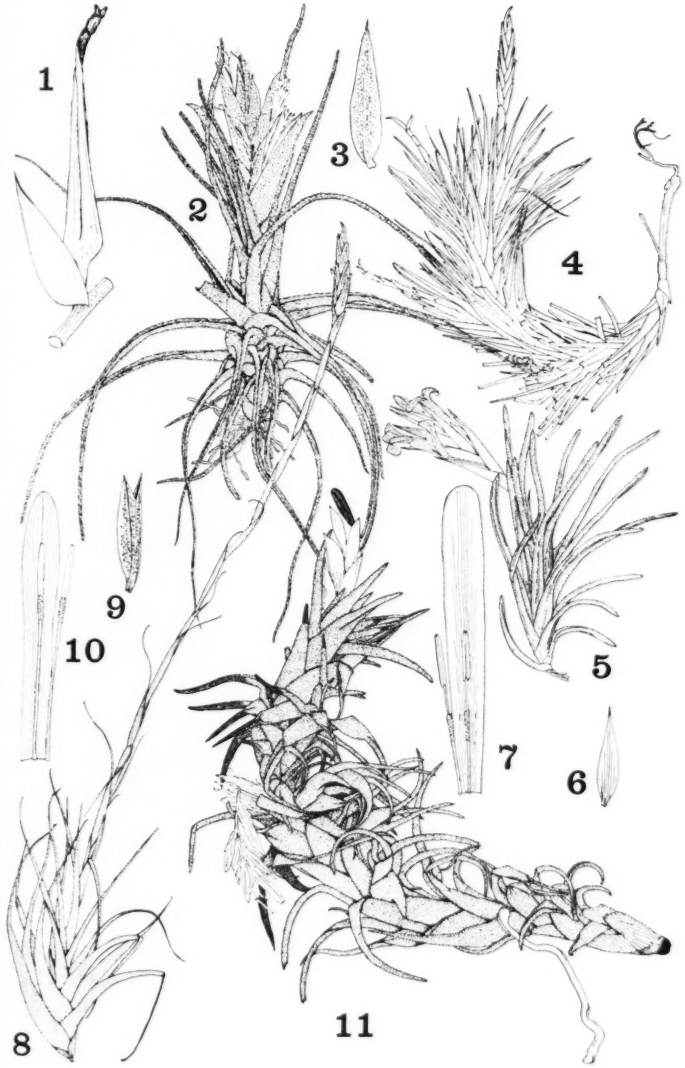


Fig. 1, PUYA SANCTAE-CRUCIS (Bak.) L. B. Sm.; 2–3, TILLANDSIA LEPIDOSEPALA L. B. Sm.; 4, T. CAULESCENS Brongn.; 5–7, T. ARGENTINA C. H. Wright; 8–10, T. INCARNATA HBK.; 11, T. FRIESII Mez.

UNIV OF MICH

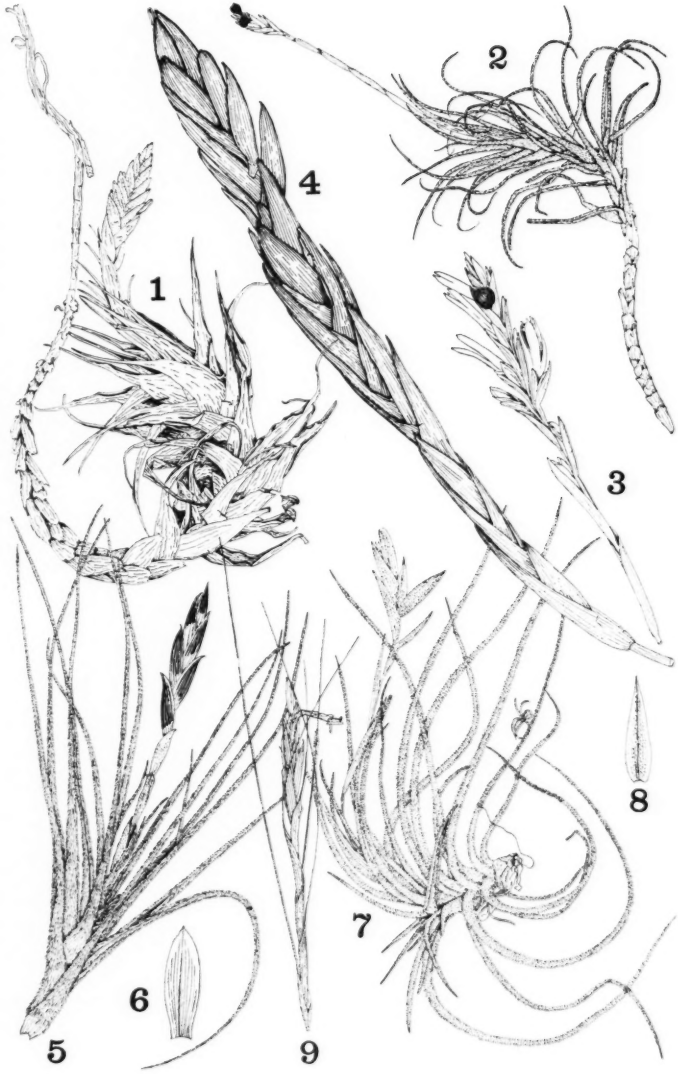


Fig. 1, TILLANDSIA CAULIGERA Mez; 2–3, T. ARHIZA Mez; 4, T. WERDERMANNII Harms; 5–6, T. CARDENASII L. B. Sm.; 7–8, T. EHRENBERGIANA Kl.; 9, T. SCHIEDEANA Steud.

UNIV. OF MICH.

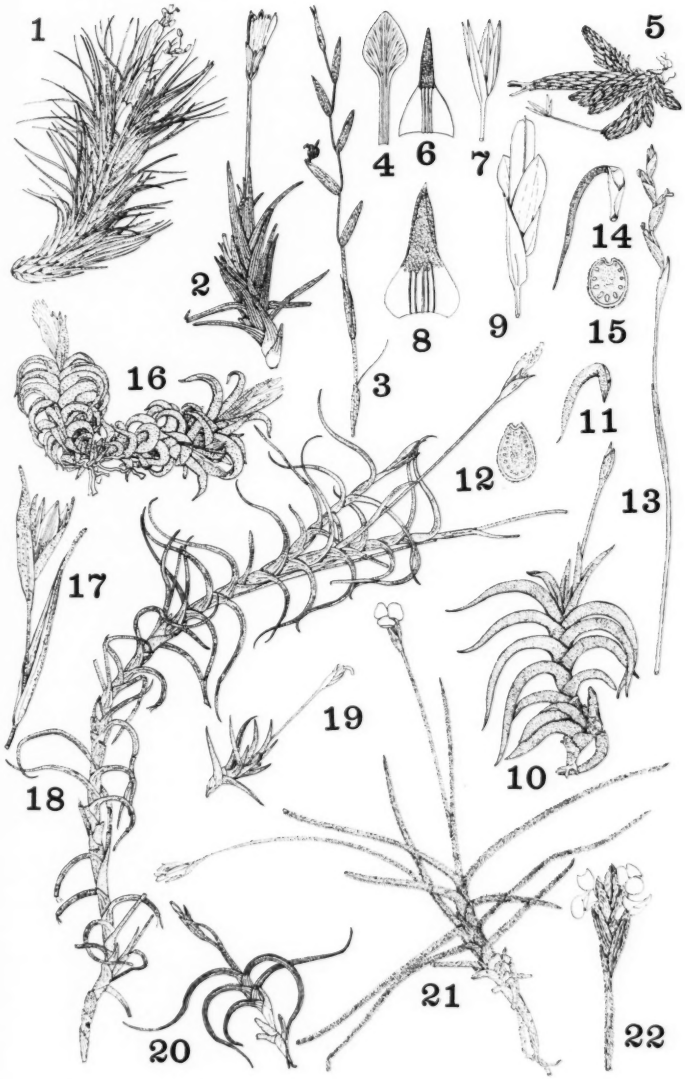


Fig. 1, TILLANDSIA FUNCKIANA Bak.; 2, T. ERECTA Bak.; 3–4, T. CAERULEA HBK.; 5–7, T. BRYOIDES Griseb.; 8–9, T. AIZOIDES Mez; 10–12, T. GILLIESII Bak.; 13–15, T. MYOSURA Griseb.; 16, T. ANGULOSA Mez; 17, T. LANDBECKII Phil.; 18, T. ANDICOLA Gill.; 19, T. RECTANGULA Bak.; 20, T. RETOKTA Griseb.; 21–22, T. CROCATA (E. Morr.) Bak.

UNIV OF